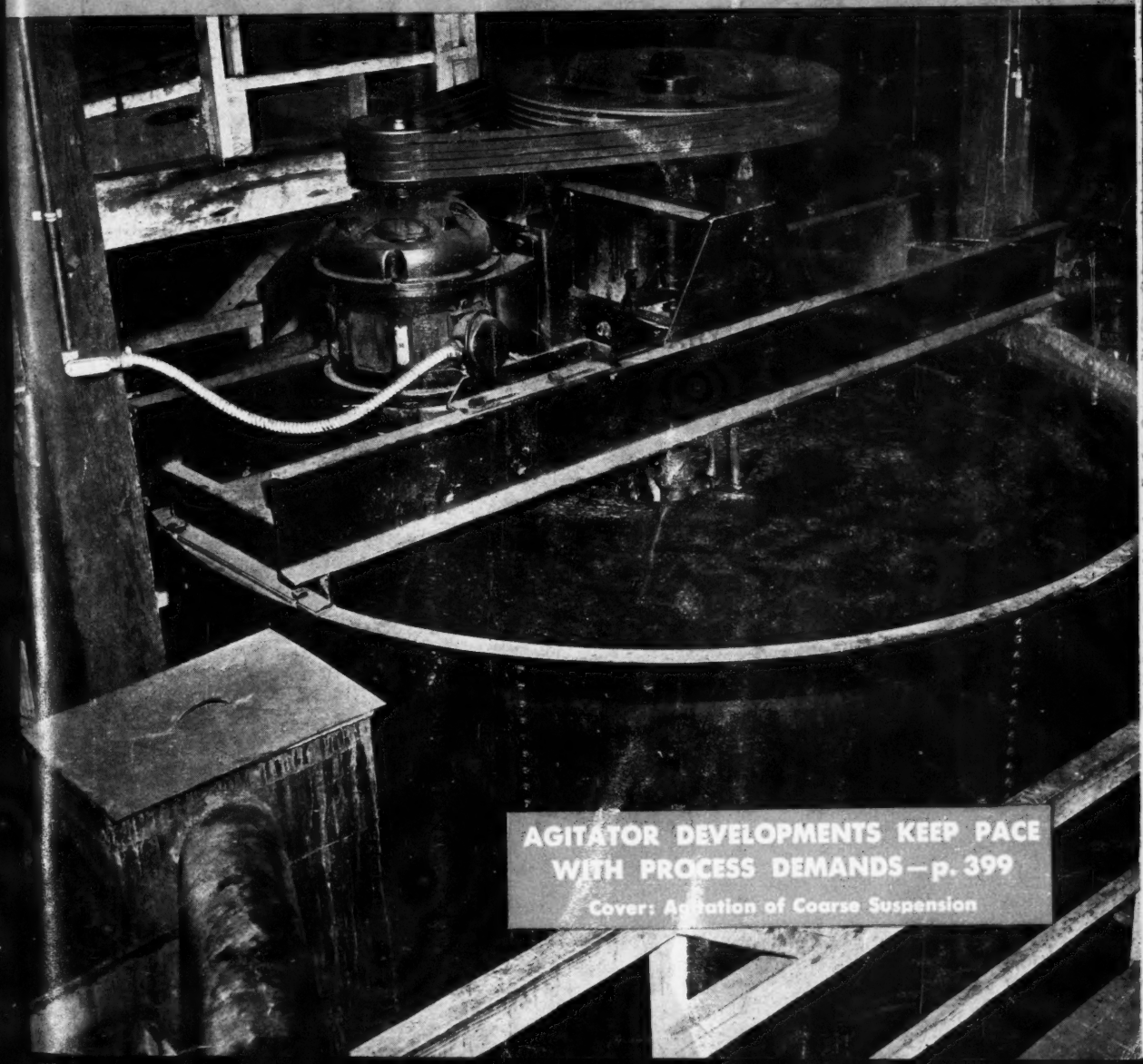
Chemical Industries

IN THIS ISSUE



AGITATOR DEVELOPMENTS KEEP PACE WITH PROCESS DEMANDS—p. 399

Cover: Agitation of Coarse Suspension

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Chemical Industries

Vol. 64, No. 3

MARCH 1949

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

What's new

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THE READER WRITES

"Legal" Profit Sharing

To the Editor of Chemical Industries:

Many employers, particularly those in relatively small industrial establishments, believe the ultimate solution of labor-management harmony lies in profit sharing, or some other kind of incentive bonus over and above "regular pay." Much progress was being made in this direction until the courts began to rule that such "bonuses" must be included in establishing "regular rates" of pay for the purpose of computing the one and one-half overtime rates required by the Fair Labor Standards Act. That made rates more than employers had bargained for.

In view of this, a recent decision by the U. S. Circuit Court of Appeals, Sixth Circuit (Cincinnati, O.), may be of interest to your readers. It concerns a relatively small corporation, employing about 400, and it cleared the employer of wage liabilities of about $1,500,000 had the court decided otherwise.

The company makes abrasive products (grinding wheels chiefly), a highly competitive and not particularly stable kind of industry. Realizing this inherent instability, the company started a number of years ago to provide incentives and attractions for its employes, which included a hospitalization plan, an annuity plan, group life insurance, and a "Production Savings Plan," which was also designed to increase production efficiency and make the employer better able to meet competition. The district court judge was satisfied that the purpose *was not* to circumvent the law, as the employe charged, but was a realistic and workable arrangement, of which the F.L.S.A. administrator was fully advised.

In the language of the court the plan was described as follows: (1) A production value was given each item produced that entered the inspection department, which value was the list price less the trade discount. The total production value was calculated monthly with adjustments for partly manufactured products. (2) A certain percentage of this total monthly production value was then computed. This percentage bore close resemblance to the direct labor costs of production in preceding years. At the inception of the plan it was 19 per cent, but from time to time increased until it was 24 per cent in 1943, where it remained up to the time of this suit. (3) The total hourly wages in straight time and in overtime for those eligible under the plan was then computed for that month. (4) If the total of the hourly wages for the month exceeded the percentage of the production value for the month, the employes received no additional compensation; but if the total of the hourly wages paid was less than the percentage of the total production value, the difference was distributed to the employes as additional compensation.

This additional compensation was distributed as follows: The amount to be distributed was divided by the total actual labor costs, including both straight time and overtime (less the hourly wages paid to ineligible employes), which resulted in a percentage figure. This figure became the bonus rate for that month. Each employe's total monthly straight time pay and overtime pay was increased by this percentage.

All this the trial judge found to be a sincere effort on the part of the employer "to share with its production employes not only any increased income resulting from increased efficiency of these production employes, but also a substantial part of the increased income resulting from its investment in improved machinery and from improvement in its engineering and management; and that the employment contract divides the incentive wages into regular and overtime segments in a realistic and mathematically workable manner." The appellant (employe) had contended that the workers were actually paid on a piece-work basis, and relied on numerous court decisions (including the U. S. Supreme Court) as proof.

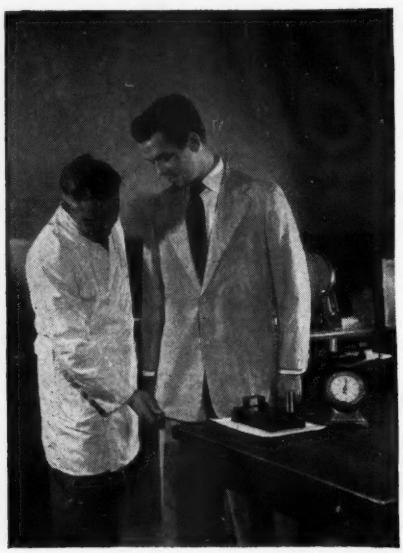
The Circuit Court of Appeals said: "This case is governed by determining the 'regular rate' at which the appellant was employed according to the Supreme Court's general definition thereof, instead of applying the rulings applicable to piece-work employment.

"It becomes merely a matter of mathematical computation. After first ascertaining the total compensation (which includes both the regular wages at the contract hourly rate and any bonus or profit sharing) actually paid during the normal non-overtime work week, such total compensation is then divided by the number of hours actually worked during the same normal, non-overtime work week (additional overtime work, if any, being excluded in making such computation). The overtime work in that week is then to be paid for at one and one-half times this regular rate so computed. Applying that rule to the present case the appellant has been fully paid."

Here then is a fair profit-sharing scheme, adaptable to almost any kind of production enterprise, which apparently will pass the test of the courts.

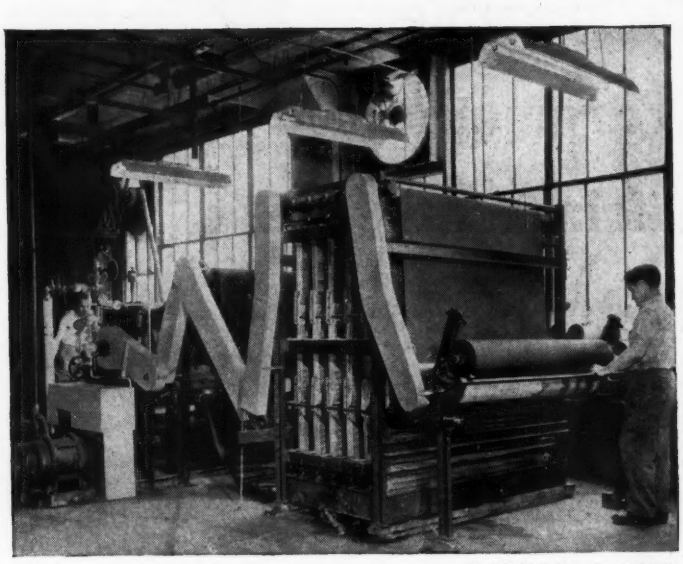
N. C. Rockwood,
Chicago, Illinois.

Life ...on the



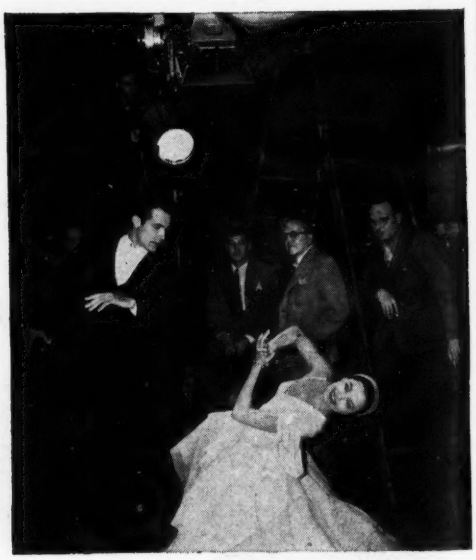
CYANAMID'S new SUPERSET* Resin Finish—the first wrinkle-resistant finish which can be applied successfully to cotton and rayon with little or no loss in tensile strength, is here being tested. Picture at far left shows young man's jacket being twisted severely to induce as many wrinkles as possible. Second picture shows the same jacket after it has been shaken out and the young man has put it on—practically wrinkle-free and perfectly wearable.

Fabrics treated with SUPERSET Resin Finish will withstand repeated laundering and dry cleaning without loss of their wrinkle-resistant properties. This premium textile finish is just one of many which Cyanamid has developed to improve the quality of textiles.



H. DAROFF & SONS, PHILADELPHIA

GREATER FABRIC SOFTNESS and improved pre-shrinkage of woolens are now obtainable at low cost when clothing manufacturers use demineralized water in processing their fabrics. Because the treated water is essentially free of dissolved minerals, it penetrates the fabric more thoroughly during wetting out, thus improving pre-shrinkage and, as it leaves no deposit on the fabric, the wool is much softer. Cyanamid's FILT-R-STIL* Demineralizers are most efficient and economical producers of mineral-free water for this and many other industrial purposes. Unlike stills, they require no heat, involve no scale problem, and are turned on and off like a faucet.



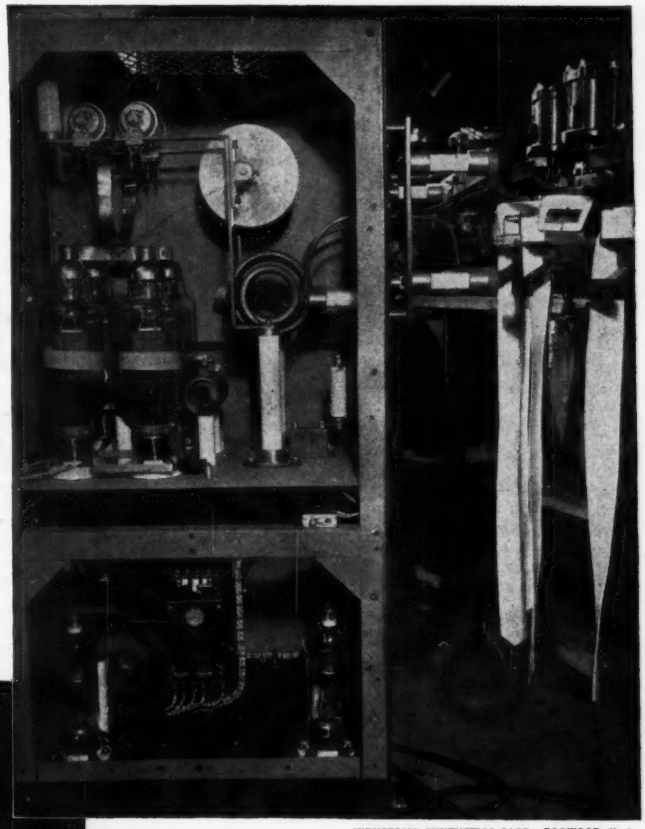
REDSOL* CRYSTALS (potassium sodium ferricyanide) are finding increasingly wide use in the photographic industry as a toner, reducer and mild oxidizing agent. This is but one of a group which makes Cyanamid headquarters for Prussiates. Included are REDSOL B Solution (sodium ferricyanide), the most economical of all the commercial ferricyanides and useful as a mild oxidizing agent; Yellow Prussiate of Soda, and Yellow and Red Prussiate of Potash.

Chemical Newsfront

NOW AVAILABLE in commercial quantities are Cyanamid's AERO** DOP (Di-2-Ethyl Hexyl Phthalate) and AERO DOPI (Di Iso Octyl Phthalate) for plasticizing vinyl resins. These high quality plasticizers combine many desirable properties: low heat loss, low brittle point and good compatability. They remain liquid down to temperatures in the neighborhood of minus 50° C, assuring flexibility of the vinyl over an extreme temperature range.

Two typical uses of AERO DOP and AERO DOPI are shown here: a plasticizer for extruded tubing and for ladies' vinyl resin belts (being electronically sealed in photo). These plasticizers are also ideal for use in vinyl resins for raincoats, handbags, shoe products, upholstery, drapery materials, shower curtains, coated fabrics, beach mattresses and adhesives. Films thus plasticized retain their flexibility through years of service. Furthermore, the outstanding electrical properties of these plasticizers make them ideal for use on vinyl resins for wire-coating.

AERO DOP and AERO DOPI give vinyl resin-coated products the extra toughness, smoothness, dryness and bright coloring which are strong sales features. From the processing standpoint, AERO DOP and AERO DOPI improve the working qualities of vinyl resins, making them more adaptable to modern, low-cost production techniques. *Reg. U. S. Pat. Off. **Trademark



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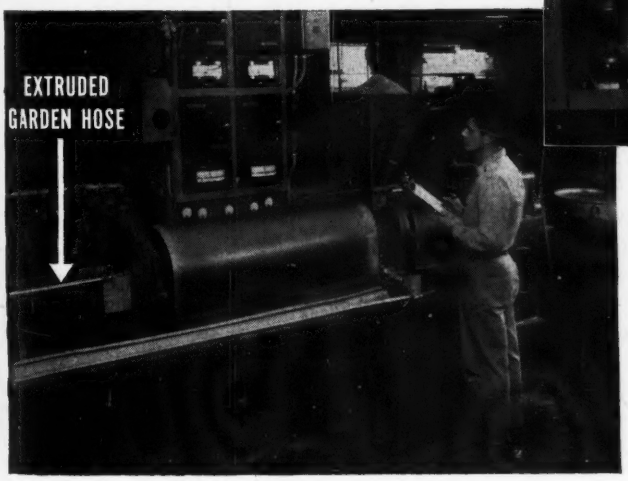

WRITE FOR LITERATURE. If you would like further information on products mentioned, check off below and mail.

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- ☐ FILT-R-STIL Water Demineralizers
- ☐ REDSOL Crystals, Red Prussiate of Potash, REDSOL B Solution
- ☐ AERO DOP and AERO DOPI

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C.I.S-49

AMERICAN Cyanamid COMPANY

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.

by Dr. M. R. McCorkle, Use Research and Development Laboratory, Armour and Company

Secondary Fatty Amines AND THEIR QUATERNARY SALTS

The first fatty amines to become commercially available were primary amines, having one fatty alkyl radical attached to an amino nitrogen atom. Now, two new secondary fatty amines of interest to industrial chemists have been added to the series of Armeens (trade name of the Armour amines derived from fatty acids).

These two new Armeens, Armeen 2C and Armeen 2HT, are commercial mixtures of secondary fatty amines. They have two fatty alkyl radicals attached to the amino nitrogen atom. The general formula for these secondary amines may be written as:

$$R_2NH \quad \text{or} \quad \begin{matrix} R \\ \backslash \\ \quad N\text{-}H \\ / \\ R \end{matrix}$$

where R represents a high molecular weight normal-alkyl (fatty) radical.

Composition

The distribution of long chain N-alkyl radicals, and the average composition and constants of Armeen 2C and Armeen 2HT are:

N-Alkyl Radicals	Carbon Chain Length	Armeen 2C	Armeen 2HT
Octyl	8	8%	...
Decyl	10	9	...
Dodecyl	12	47	...
Tetradecyl	14	18	...
Hexadecyl	16	8	30%
Octadecyl	18	10	70
Approx. mol. comb. wt.		435	520
Apparent secondary amine		80	90
Approx. melting point, °C		46°	68°

Volatility

Both Armeen 2C and 2HT boil at higher temperatures than corresponding primary amines. Because these products are mixtures, they distill over a wide temperature range and especially in the case of Armeen 2C, overlap on the distillation range of corresponding primary amine mixtures. At a pressure of 0.5 mm. of mercury, Armeen 2C distills over the range 160-275°C; while Armeen 2HT distills between 200-275°C at the same pressures.

Solubilities

Armeen 2C is soluble in benzene, cyclohexane, trichloromethane, carbon tetrachloride, ethyl ether, butyl acetate, methanol, 95% ethanol, isopropanol, and n-butanol. It is sparingly soluble (soluble hot) in ethyl acetate and 2-butanone; soluble hot in acetone; and sparingly soluble hot in acetonitrile. Armeen 2C is insoluble in water.

Armeen 2HT is sparingly soluble (soluble hot) in trichloromethane and carbon tetrachloride; soluble hot in benzene, cyclohexane, ethyl acetate, butyl acetate, isopropanol, n-butanol, and 2-butanone. It is sparingly soluble hot in ethyl ether, acetone, and 95% ethanol. Armeen 2HT is insoluble in methanol, acetonitrile, and water.

Reactions

The reactions of Armeens 2C and 2HT are similar to those of the primary amines. They are organic alkalis and react readily with organic or inorganic acid groups.

Oil-soluble quaternary ammonium salts may be produced from the secondary Armeens. (Available commercially as Arquad 2C and Arquad 2HT.) It is often possible to make oil-soluble salts of inorganic acids using the secondary amines as the alkali.

Suggested Uses

In lubricant additives, rust inhibitors, rubber chemicals, textile treating agents, oil-soluble quaternaries and synthetic waxes.

SECONDARY ARQUADS

The availability of the secondary fatty amines has also made possible the production of the secondary quaternary ammonium salts, which Armour has trade-named Arquad 2C and Arquad 2HT. (A series of primary amine Arquads —water soluble—has been available for some time.)

Compatibilities

The oil-soluble Arquads are compatible with both cationic and non-ionic materials. They are not compatible with anionic materials such as soaps or the common anionic synthetic detergents. Their average composition is listed on the chart below:

N-Alkyl Radicals	Carbon Chain Length	Arquad 2C	Arquad 2HT
Octyl	8	8%	..
Decyl	10	9	..
Dodecyl	12	47	..
Tetradecyl	14	18	..
Hexadecyl	16	8	30%
Octadecyl	18	10	70
Total active quaternary		75%	75%
Salt (NaCl)		less than 1%	less than 1%
Isopropyl alcohol		about 24%	about 24%
Form at room temp.		liquid (clouds at 20°C —gels at -25°C)	soft paste (liquid at 60°C)

The oil-soluble Arquads are stable at both high and low pH's and in the presence of most water-soluble salts. They are not precipitated by hard water.

Solubilities

These oil-soluble secondary Arquads are dispersible in water, soluble in naphtha, most hydrocarbons and a variety of other organic solvents.

Commercial Applications

Surface Activity: Oil-soluble Arquads lower the surface tension of water. (From 72 dynes at 25°C, 0.1% dispersion of Arquad 2C reduces tension to 30 dynes, 0.1% of Arquad 2HT to 37 dynes.)

Emulsifying Agents: Because of their dispersibility in water and their solubility in oils, the oil-soluble Arquads are capable of emulsifying oils into water. Such emulsions are "substantive" to cloth, wood, pigments, etc.

Dye Substantivity: Small percentages of Arquad 2C added to the dye baths result in substantivity of dyes for many types of textile materials—even hard-to-dye nylons.

Textile Softeners: These Arquads are powerful cationic softening agents for textiles. They are excellent for their non-yellowing properties.

Germicides: Arquad 2C is a powerful germicide in water dispersion.

Mold Inhibitor: Arquad 2C is also an effective mold inhibitor.

. . . . . .

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Photo Courtesy American Anode, Inc., Akron, Ohio

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6 Baker Chemicals for the Rubber Industry

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The dependable uniformity and high quality of Baker's Calcium Nitrate gives it an ever-widening appeal to the rubber industry.

Especially manufactured for use by latex compounders, Baker's Calcium Nitrate has the exceptionally high purity demanded in a coagulant. It has superior wetting qualities . . . does not harden in the barrels, and remains in workable condition . . . gives more uniform results, with less trouble in process work.

This product is a technical crystal ranging in size from 1½" to smaller sizes. It is a creamy white color. It contains 3 molecules of water of crystallization.

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DISINFECTANTS

High in terpene alcohol content, Hercules Pine Oils are widely used in disinfectants. They are effective, low in cost, safe and easy to use, have a pleasing piney fragrance, long-lasting disinfectant action, do not stain.

MINING

In the mining industry, Hercules Pine Oils are used as frothing reagents in the flotation process. Low in cost, pine oils are effective frothers for the flotation of sulphide minerals—especially where a highly mineralized froth is required. Pine oils are also employed in the flotation of coal, potassium chloride, and talc.

PAPER

Pine oils diverse properties are responsible for their wide acceptance in the paper industry. They are used as anti-frothers, casein preservers, and as wetters and spreaders in coating operations.

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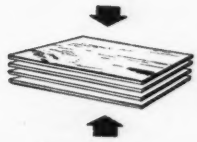

PLYWOOD ADHESIVES

Pine oils are used as anti-foaming agents, wetting agents, and protein preservatives in plywood adhesives. They perform a similar function in adhesives based on glue, casein, and starch.

YOUR INDUSTRY

Hercules Pine Oils have application in many other industries, such as the textile, soap, cleaners, drug, leather, rubber, and laundry industries. Possibly pine oils have new and desirable applications in your industry? Why not send for literature and testing sample?

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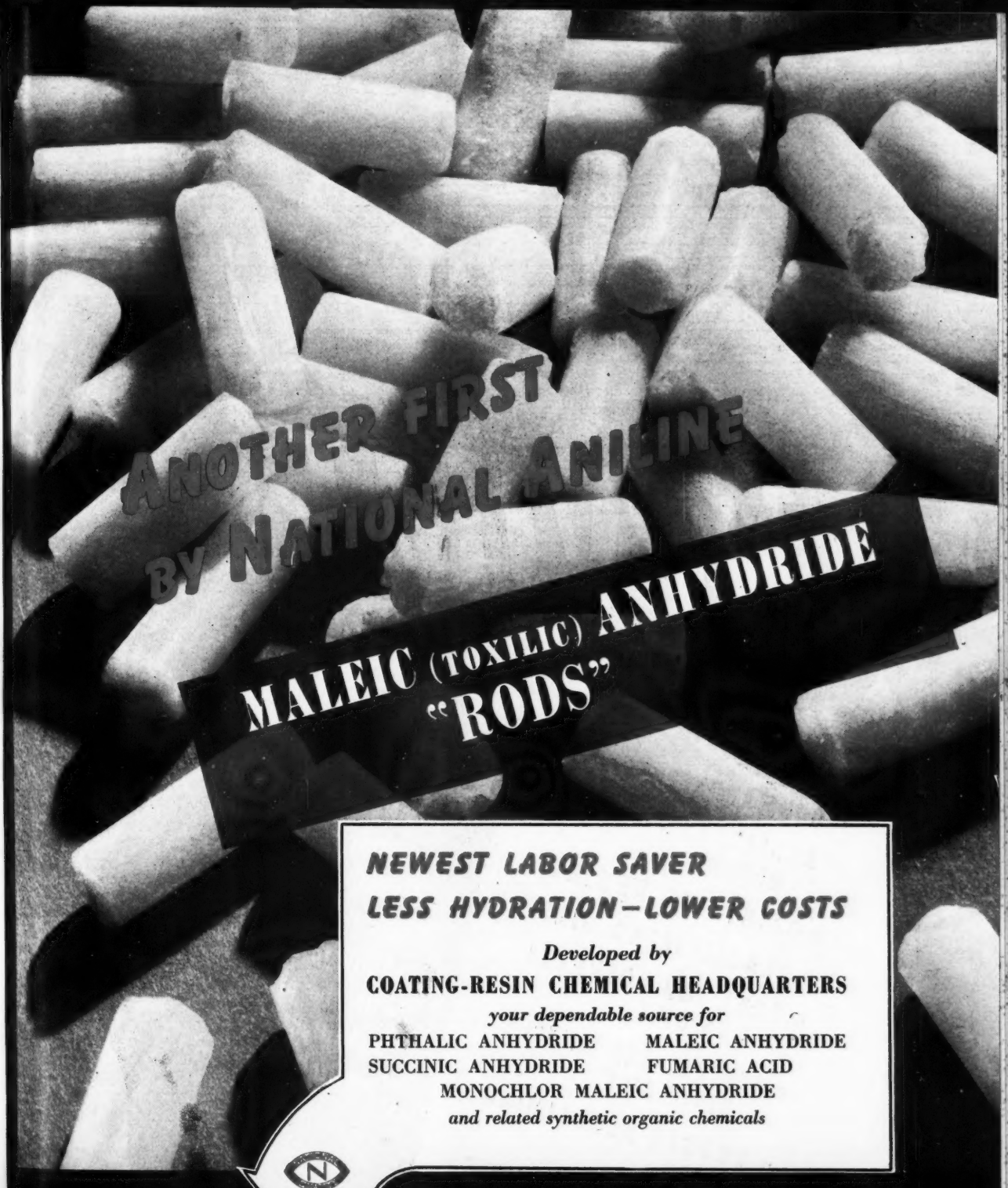

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- **Inhibition of acid solutions for cleaning process equipment**
- **Pickling cast iron with hydrochloric acid**

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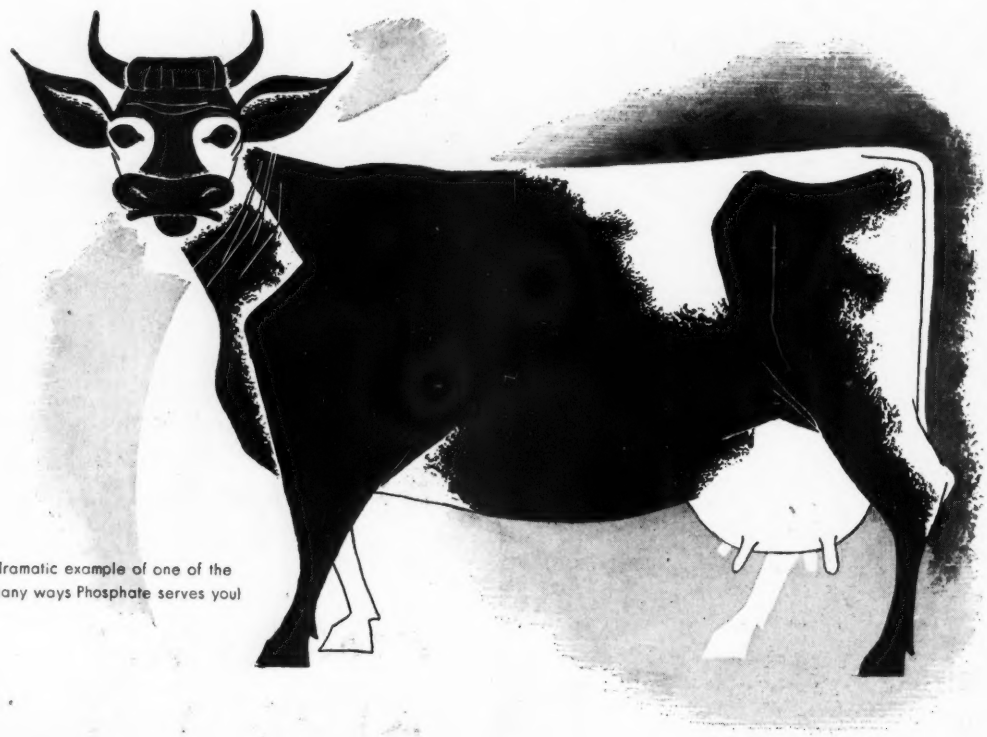

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Tennessee Phosphate

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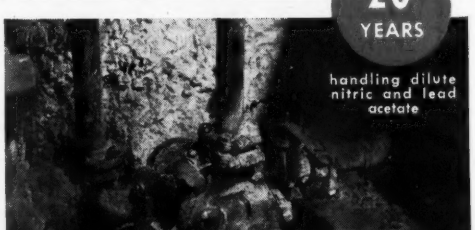

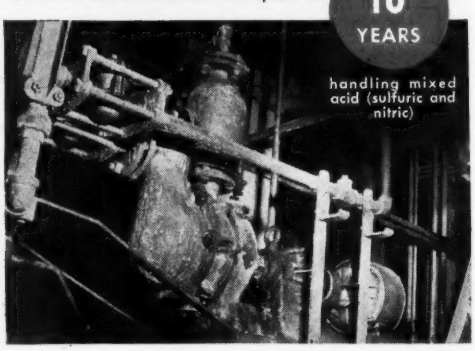

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DURIMET—a high Ni-Cr-Mo-Cu low carbon stainless steel. Successfully handles sulfuric and sulfurous acids, oleum, caustic, bleach and other solutions. *Ask for Bulletins 112 and 815.*

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Isopropyl Ether—$C_3H_7OC_3H_7$
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ENJAY HYDROCARBONS

Butadiene—$CH_2{:}CHCH{:}CH_2$
Isobutylene—$CH_2{:}C(CH_3)_2$
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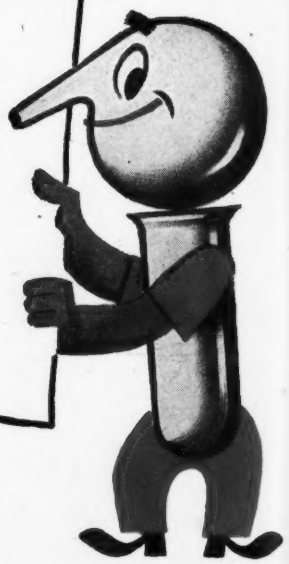

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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
March, 1949

For Your Information:

Chemical men are keenly watching Floz-On Manufacturing Co., which has plans afoot for synthesizing ethylene glycol from natural gas and steam in a plant costing over $1 million on the Houston Ship Channel. A 28-acre site has been purchased and construction contracts have been awarded to the Austin Co. Published reports state that the capacity will be 25 million gallons a year, but that figure would represent 60 per cent of U. S. production in 1948. The correct figure is probably closer to 5 million. Sears Roebuck & Co. is said to be considering investment in the project.

More about glycol: A 50 per cent expansion of ethylene oxide and ethylene glycol capacity is planned by Jefferson Chemical Co. at Port Neches, Texas. It will come into operation in 1950. Jefferson's forecast of 1949 total glycol demand is 450 million lbs. as against an estimated 380 million lbs. in 1948. Out of this 1949 figure the company assigns an anti-freeze demand of about 298 million lbs. (32 million gallons) for the 1949-50 winter.

* * CI * *

Phenol and acetone are co-products of a new process developed by Hercules Powder Co. out of its cumene hydroperoxide work: The latter material (which is derived by air oxidation of cumene, obtained in turn by alkylation of benzene with propylene) is catalytically broken down at relatively low temperature to give quantitative yields of the co-products.

Pilot-plant production of ethyl and butyl trichlorosilanes and possibly cyclohexyl trichlorosilane will be announced shortly by Plaskon Division of Libbey-Owens Ford Glass Co., Toledo, O. This will be Plaskon's first excursion into the straight chemicals field.

* * CI * *

Electrical conductivities ranging from those of distilled water almost to metallic mercury can be obtained in a new line of thermoplastic, thermosetting and elastomeric conductors. Called Markites, they were developed by the Markite Co., New York, in conjunction with the Naval Ordnance Laboratory, Silver Spring, Md. Until now there

have been few materials of intermediate conductivity—i.e., a millionth to a hundredth that of copper.

Another stride forward in the growing field of antibiotics is the completion, by Parke-Davis & Co., Detroit, of the first commercial chloromycetin plant. Structure of chloromycetin, incidentally, is believed to be 1-nitrophenyl-2-dichloracetamido-1,3-dihydroxypropane.

* * CI * *

Continuous rather than batch production of soap by Procter & Gamble will be provided by a million-dollar project expected to be completed about July 1 at Kansas City. P & G has just completed another million-dollar expansion at that location.

Minnesota Mining & Manufacturing Co. is testing a disposable bottle label. The label is made of a material that dissolves when the bottle is passed through a special rinse in the washing operation, thus eliminating one of the nuisances encountered in the re-use of beverage bottles.

* * CI * *

Research progress in surface-active agents: Investigations in the laboratories of E. F. Drew & Co. indicate that alkylol amides of fatty acids, generally classified as non-ionic detergents, should be regarded rather as "enhanced soaps", for their effectiveness depends on the small amounts of soaps (alkylol amine salts) present in the reaction mixture...A new series of quaternaries—the quaternary ammonium methosulfates—are claimed to be compatible with high concentrations of alkalis, thus overcoming one of the major drawbacks of present commercial germicides of the quaternary type.

Construction will start shortly on a fluidized-catalyst phthalic anhydride plant in Great Britain. This will be the first "fluid cat" phthalic plant to go up since the initial unit at Sherwin-Williams' Chicago plant in 1944.

* * CI * *

Here and There:

Ground is being cleared on 20 acres of Du Pont's 800-acre site at Camden, S. C., for the new Orlon plant. Construction is scheduled to start this month...Lion Oil Co.'s synthetic ammonia capacity will be 570 tons a day—up 33 per cent—when a $3.5-million expansion is completed...A New England company is studying the possibilities of making amino acids from fish scales...Merchants Chemical Co., New York, is marketing in bulk its optical bleach, Merco-Brite, to soap manufacturers, converters, laundries and similar establishments...Hercules Powder Co. is again expanding Thanite output at Brunswick, Ga., after last year's cutback...Nonic, Sharples Chemicals' new non-ionic detergent originally called Nyon, is an alkylene oxide condensation adduct...Tennessee Eastman Corp. is now manufacturing and offering dioctyl phthalate...U. S. Patent 2,458,718, assigned to Allied Chemical & Dye Corp., discloses the use of boron oxides and halides to stabilize sulfur trioxide (CI, May 1947, p. 771).

The Editors

Ma

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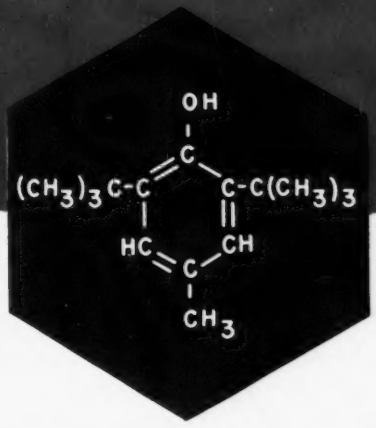

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UTOPIA NOW

by ***ROBERT L. TAYLOR, Editor***

THE SO-CALLED Economic Stability Act of 1949 (H. R. 2756), introduced last month in the House of Representatives, will be laughed off by many as nothing more than a gesture—harmless politics, the discharging of a campaign promise. But politics or not, it is one of the most artful pieces of skulduggery ever placed before the Congress of the United States.

If it becomes law, H. R. 2756 will provide all of the machinery necessary to complete the process of socialization of industry in this country—if, as and when the party in power wills it. It will make the President virtually economic dictator of the nation.

The bill is said to be the work of Leon Keyserling, left-wing member of the President's Council of Economic Advisors. It was introduced in the House by Representative Brent Spence of Kentucky and has been referred to the Committee on Banking and Currency.

Like all steps toward collectivism, the professed purpose of H. R. 2756 is laudable. Couched in terms that even the most illiterate voter can understand, this purpose is "to promote maximum employment, production and purchasing power." With so general and lofty an objective, there can be nothing but agreement. It is as if someone proposed a law to banish fear, war and pestilence.

But, here is how Utopia is to be achieved:

Under the provisions of the bill, the President shall from time to time designate shortages which "he finds [are] affecting adversely, or threaten to affect adversely, the domestic economy (including the maintenance of maximum production and employment), free competitive enterprise and particularly small business, the general welfare, the national security, or the carrying out of the foreign policy of the United States."

Whenever the President designates that such a "shortage" of any material exists, "he shall determine approximately the quantity goals to which it is necessary and feasible to increase the supply within a specified reasonable period of time; . . . and develop such Federal programs at home and abroad as may be needed to supplement the efforts of private enterprise in achieving the quantity goals . . ."

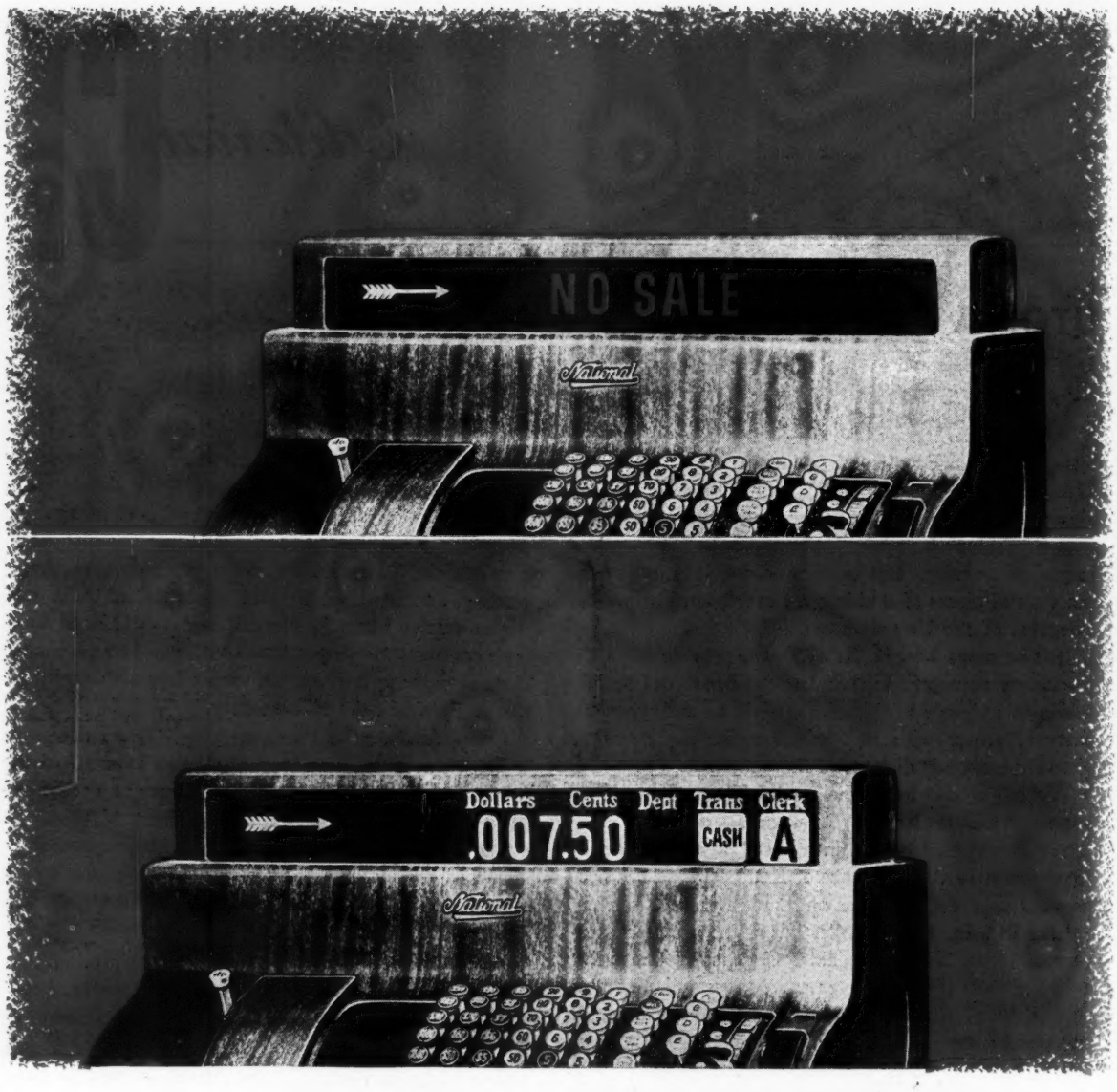
Whenever the President "determines that it is necessary" he may contract for "research or development related to the improved utilization of such designated materials or facilities or any substitutes therefor or to methods and processes for the production thereof, including the construction and operation of pilot and demonstration plants." The bill empowers him to make such contracts, moreover, "without regard to the limitations of existing law, and on such terms and conditions as the President deems necessary."

Going further, the President may, "when necessary to help achieve the quantity goals," make loans to private industry on which he later "may reduce or defer payments of interest or defer the payment of principal, or both, in whole or in part." He is also empowered to construct new plant capacity for the government's own account, order compulsory allocation of materials, and impose compulsory price and wage controls.

As can be seen, the bill provides blanket power of control by the President over all phases of the economy. It is fully as socialistic as anything ever proposed by the Labor Party in Great Britain. Even in that country, the power of nationalization is not vested in one man.

Few will any longer argue that the government should exercise no control whatever over the economy. Certainly when a free market is allowed to function without restriction it makes for extreme wealth and extreme poverty. But stabilization measures can be taken without creating an economic dictatorship. Prices can be influenced by vigorous use of fiscal and monetary policies. Monopoly can be dealt with on an individual basis. And when other controls are necessary, they can be specific and applied by Congress, not the President.

The chances of passage of any bill as drastic as H. R. 2756 this year do not seem great at the moment. The ominous thing about such a bill, however, is that it may be a forerunner of similar innocent-seeming bills to come. It is likely to appear year after year in a new disguise until, at some unguarded moment, it manages to slip through and become law. In our mobilization against tyranny, let us not succumb to tyranny.



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Chemical Industries
MARCH, 1949

What's new

DU PONT'S SABINE RIVER WORKS: Methanol from methane in two steps.

PETROCHEMICALS—1949 MODEL

Balance of petrochemical supply and demand signals end of customer clamor, sparks re-evaluation of competitive position.

COMPLETION of the petrochemical plants now under construction will form the basic structure of the petrochemical industry for some time to come.

Many changes are still to come and they will be extremely rapid. The headlong rush to get into the "petrochemical game," which has characterized the industry since the end of the war, will be replaced by good old-fashioned competition of the "build a better mousetrap" variety. The recent tumble in ethanol and formaldehyde prices is striking evidence that the one-time seemingly inexhaustible thirst for petrochemicals can be quenched.

Raw Materials

Most petrochemicals are now being produced either from LPG* or from refinery gases. However, the prices which can be obtained for these materials for other uses such as domestic fuels and alkylation components for the production of high-octane gasoline are so high that chemical producers must look to other hydrocarbon sources.

There is no question that there is much more LPG potentially available than is now being used. But, assess these potentials with an eye to the requirements of the petrochemical producer and they dwindle quite rapidly. For a petrochemical plant to be established, a continuous supply of large quantities of hydrocarbon raw material at a single point for more than fifteen years is a must. Although there is much LPG, there are not many locations of the type specified. Low raw material cost is essential if reasonable profits are to be realized under the present price structure.

Ethane and Methane

A representative of one of the largest petrochemical producers recently predicted that eventually most petrochemicals would be made from methane, and, he added, both C_1 and C_2 products are already being prepared from this raw material.

A major problem connected with the use of the low-molecular-weight hydrocarbons is that very high temperatures are required for reaction. Thus attention is moving from LPG, first to ethane (which reacts at a lower temperature than methane) and then to methane.

Ethane is available in extremely large quantities—larger, in fact, than LPG. However, ethane is a permanent gas and the location restriction noted for LPG applies even more forcefully to ethane. Also, ethylene can be obtained in much larger yield than from propane, the present favored raw material.

Methane is by far the cheapest source of carbon and hydrogen, and it is available in huge quantities at low cost. Further, the number of potential locations for a petrochemical plant using methane as a raw material is far greater than for LPG or for ethane.

Methane is now being transformed into chemicals by four routes: (1) It is being directly oxidized to formaldehyde and methanol. (2) It is being chlorinated to form carbon tetrachloride and other C_1 chlorine derivatives. (3) It is being used for the formation of synthesis gas, a mixture of carbon monoxide and hydrogen, from which several chemicals are now being produced. And (4) it is being

*Liquefied petroleum gases (butane, propane, or their mixture).

McCARTHY CHEMICAL: Methanol and formaldehyde from methane and ethane in one step.

chlorinated in the presence of carbon tetrachloride for the production of perchlorethylene. Although some of these routes have been traveled for a number of years, many further advances may be expected, particularly in the production of organic chemicals with two or more carbon atoms.

The hydrogenation of carbon monoxide is the most versatile chemical reaction known. It is now being used for producing a wide variety of chemicals and will be used for the production of many more in the near future, from the oxygenated materials of the American version of the Fischer-Tropsch process and other new syntheses, such as the manufacture of iso-octyl alcohol by the Oxo process (*CI, Aug. 1948, p. 211*). The alcohol is formed by passing a mixture of a C_7 olefin, carbon monoxide, and hydrogen over a catalyst.

Cancelling of one of the two units planned for the production of synthetic gasoline has halved this promise, which at one time encompassed the possibility of supplying a major portion of the chemical industry's oxygenated acyclic organic compounds.

A very desirable feature of the carbon monoxide-hydrogen reaction is the possibility of transferring production to coal-based raw material, if and when such a procedure becomes necessary. This does not appear as imminent as it did a year ago (*CI, March 1948, p. 390*) when petroleum prices were still going up and demand was not totally satisfied.

Since that time conditions have changed. There is an adequate supply of crude petroleum now, and an attempt last fall to raise the price of crude to three dollars per barrel was resisted successfully. In many quarters the prediction of a reduction in the price of crude oil is quite freely offered. The costs of discovery of a barrel of petroleum have advanced so much, however, that any reduction can be only of a minor nature.

The best promise of a price reduction in the price of crude oil comes along the Eastern seaboard where importation of Arabian crudes from the Middle East is gradually assuming major importance.

Acetylene

Production of oxygenated alicyclic organic chemicals from acetylene has not expanded greatly in spite of the many glowing promises which were made for "Reppe-Chemie" at the war's end. Some products of a specialty nature are on the market but these are not usually sold in tank car quantities.

If the reported plans of the Tennessee Eastman Corp. materialize, the economics of acetylene may be tied to the cost of natural gas and not to the cost of coal as is now the case. Instead of being an alternate source of alicyclic oxygenated organic chemicals, acetylene will itself become a petrochemical.

The recent price reduction in ethanol may have a profound effect on these plans, as it is Eastman's present source of acetic acid and acetic anhydride.

Crystal Ball

Capacitywise, petrochemicals have attained fairly level ground. Supply has finally caught up with demand, giving the industry time to pause and digest the huge expansion of the past few years before spawning, probably from methane, new products, new processes, and increased supplies of present products.

VINYL SPONGE

Polyvinyl formal is basis of synthetic household sponge.

FROM airplane fuselages to household sponges seems like a long jump, but that's the itinerary of Ivalon, a new polyvinyl formal sponge now being made and marketed by Ivano, Inc.

The story started in 1943, when the British government started to worry about balsa wood supplies. Design of the famed Mosquito fighter called for "sandwiches" of balsa between layers of plywood—a construction combining high mechanical strength and extremly low weight. Abnormal demand for the natural material, which was imported from South America, caused the price to soar and the quality to skid. The obvious answer: a synthetic replacement.

Wilson at Revertex

But replacement—although obvious—wasn't easy. The substitute had to be rigid, certain strength specifications had to be met, lightness (density about 0.1) was required, and the material had to be stable at high humidity and temperature.

Revertex Ltd. was one of the companies assigned to work on the project, and Christopher L. Wilson, then with the University of London, carried out much of the research. The material finally developed for the project was a polyvinyl formal sponge, made by frothing an aqueous polyvinyl acetate emulsion with air and hardening the wet, spongy structure with formaldehyde in the presence of an acid cataylst.

Other Answers

Two other organizations came up with two other, less successful answers. One was a polyvinyl formal sponge made by subjecting a solid polyvinyl formal resin, softened by heat, to the action of solvents and high-pressure nitrogen. Some of the gas dissolved, and simultaneous cooling and release of pressure caused the formation of small bubbles. Equipment requirements, however, were expensive.

The third substitute was an alginate sponge. A solution of sodium alginate, obtained from seaweed, was beaten into a froth and insolubilized by treatment with calcium salts. But, the resultant product lost strength in a humid atmosphere.

Another advantage of the first material, not shared by either of the others, was that the bubbles were connected and the mass, therefore, could be easily washed and dried.

None of the materials was ever manufactured on a large scale, for adequate supplies of balsa became available as the work was nearing completion.

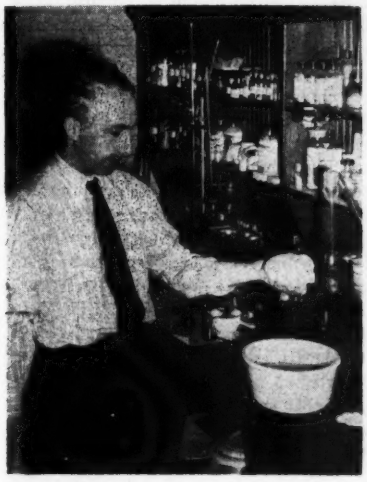
Further Work Here

Wilson came to this country, first to the University of Notre Dame, later to the staff of Ohio State University. He continued his researches and developed the current process used by Ivano.

Polyvinyl alcohol solution is used instead of polyvinyl acetate emulsion. The solution is frothed with air to give a product that is hard when dry but which softens rapidly upon wetting. The polyvinyl alcohol foam is poured into molds and hardened with formaldehyde. The set material is simply removed, washed, and cut up for packaging.

The new process permits ready control of texture and added color. As manufactured for general use, the sponge looks like fine-textured white bread. It can be manufactured in a range of colors, textures and sizes.

Withstanding boiling water, the sponge can be easily sterilized. It is also resistant to alkalis, dilute acids, soap, and most detergents (but it swells in 5% solutions of some synthetic wetting agents). Tougher and more abrasion-resistant than natural or cellulosic sponges, it does not deteriorate on aging (like rubber sponges) nor become moldy (like natural ones).



CHRISTOPHER L. WILSON: "Wrings like a rag . . . "

Packaged Wet

The sponge is hard as stale toast when dry, but the cellophane-wrapped product which the housewife buys is soft and supple thanks to a packaging *coup*: the sponges are packaged moist, a hygroscopic substance is added, and the wrapping is virtually moisture-proof.

Ivano is counting on high eye-appeal as well as long life to open markets for the "Ivalon Miracle Sponge" which, according to the label, "wrings out like a rag . . . wipes clean like a chamois." Walls, woodwork, windows, dishes, bath, and automobiles are suggested in large type, and Ivano is counting on the housewife's ingenuity to find a thousand other uses.

AMERICAN MONTAN

Montan wax now in production from California lignite.

A DEVELOPMENT begun in Arkansas during the war came of commercial age recently in California with the first carload shipment of American montan wax. The material, a hard and brittle wax, is being produced from lignite deposits at Ione, Cal., by the American Lignite Products Co., a division of the DeAngelis Coal Co., of Carbondale, Pa.

Technical director of the venture is Raymond L. Drew, an old hand at the game with his experience as research director of the American Dyewood Co., N. Y., which conducted the most important early work of this type during the war at a plant in Malvern, Ark. When DeAngelis Coal acquired extensive areas rich in lignite with the aim of producing wax, chemicals and special fuels, his knowledge of the other project plus a careful study of German procedures formed a good basis for pilot-plant and other exploratory work. This culminated in construction of the present plant for production principally of montan wax.

Easy Stripping

Removal of the lignite entails a mining and stripping operation, but since much of the American lignite carries very little overburden, it can be stripped most economically. After drying, it is pulverized and extracted in a battery of solvent-carrying extractors equipped to discharge the spent lignite and carry to another system the liquor containing the wax and other extracted material. A subsequent separation and extraction is carried out for refinement and general purification of the wax. At this point it is further refined to yield waxes of lighter color and high purity.

The regular grade of American montan wax now appearing on the market (American Lignite Products is the only domestic producer) is said to be comparable to the best prewar imported grade. Because of its high true wax ester content, it is being recommended in applications where the previous American production and the material now being imported cannot be used. The producers report that current fields of use are polishes, carbon-paper production, wire coating, and various wax sprays. All industries requiring a high-melting-point wax are potential customers.

Starting from Scratch

Montan wax is in a position similar to that of the fellow who came home from the war to find his old girls all married—it has to start from scratch. Prewar imports were about 8,000 tons a year, mostly from Germany, which boasted a combination of excellent deposits of lignite and long experience in montan extraction. (German deposits contain 8-10% montan which is extracted by mixtures of common solvents such as benzene, acetone and methanol.)

During the long period when the wax was unavailable, users switched to substitutes and, with new formulations established, may not be anxious to swing back to a material selling for three times the old price. (Both the present imported material and the American product are in the 30-34 cents-a-pound range.)

American Lignite's current production of several thousand pounds a day indicates that it has found some market, and the expectation that future production will reach the volume of prewar imports means that the company is out to gain old montan outlets and cultivate new ones. The Germans produced "bleached

AMERICAN LIGNITE PRODUCTS: Wax in California.

montan wax" which varied in color from yellow to white, and also the IG synthetic waxes that were derived from bleached montan's montanic acid content. These were highly valued by manufacturers, but are returning at very high prices (from 76c to over $1 a pound). Although the new producers of montan have not indicated any plans to go into such production, the possibility exists, and those who follow the venture will be anxious to see whether it heads in that direction.

MAYWOOD'S MAZE

Maywood Chemical Works is small, but its products range from flavors to rare-earth salts.

LIGHT was cast on the activities of publicity-shy Maywood Chemical Works by the recent offering and sale of a sizable portion of all three issues of its stock (23.1% of the common, 29.28% of the participating preferred, and 32.85% of the cumulative preferred) by the Office of Alien Property of the Department of Justice. These shares were vested by the Department in 1944 and 1947 since they were the property of German nationals, Amalia Janner, and Kurt and Ernst Kyriss. Maywood purchased the shares from the government for $847,500 for eventual retirement.

Maywood is particularly intriguing because of the extreme diversity of its interests, ranging from production of caffeine for the soft-drink industry to the separation of the rare earth compounds from monazite sands. Although the company's gross sales probably reached $5 million in 1948 with a net profit approaching $500,000, the company employed no force to sell its products which, with the major exception of the pharmaceuticals, are sold directly to a few large industrial users. The residue of the sales are made through prominent distributors serving various fields of industry.

Caffeine

One contract (source of 42.5% of the company's total income from sales for a three-year period ending last May) deserves particular attention. As this contract is believed to be for caffeine, and has been in force for over 35 years, it would appear that Maywood and Coca-Cola drinkers have a lot in common.

The contract which terminates at the end of 1957 includes two provocative provisions for its cancellation: (1) In the event that twenty per cent of the common or other class of stock, having power to vote for directors, is transferred from its present owners other than by inheritance, or (2) if the present president or treasurer of Maywood should cease to occupy such office, by reason other than death or voluntary resignation, the buyer may, at its option, cancel the contract after thirty days' written notice.

A sizable portion of Maywood's production of caffeine is synthesized from theobromine, which is derived from a variety of plant sources.

Origins

Tightly-held Maywood (reported to have only 23 stockholders) takes its name from its plant location at Maywood, N. J. It was formed late in 1918 by the consolidation of three companies: Standard Essence Co., Thorium Chemical Co., and Schaefer Alkaloid Works. The latter two had been organized, developed, and controlled by Dr. Louis Schaefer, who came to the United States from Germany in the 1890's. After the organization of these two companies, Schaefer acquired in 1902 a controlling interest in the Standard Essence Co. which was managed by Edwin W. Preston. The Preston and Schaefer families still control the company.

Li, Cs and Rb

Maywood was the first large producer —and is still one of the largest—of lithium chemicals. Its operations began some time before 1925, as is indicated by the first depletion charge, deducted from the company's income tax return of that year, for its spodumene mine at Keystone, S. D. Rubidium and caesium are produced from the same ore. Maywood has several other spodumene properties but as yet has operated only one mine.

Rare Earths

Production of rare earth salts (cerium, lanthanum, neodymium, etc.) has always been a stickler even in the laboratory; and Maywood is one of the few organizations to do it for profit. Ceria has been used for the polishing of optical glass but during the war it and other rare earths had more important and mysterious uses. In view of the large amount of research on these materials which has recently been reported from AEC laboratories or AEC-sponsored projects, one can infer that they were utilized in connection with the atomic energy program. It is known that Maywood was producing under certain confidential contracts for both the War and Navy Departments during the war.

Monazite sands, the raw material from which these materials are obtained, is imported from the Far East and has been reported to be in short supply. Thorium is another constituent of these sands and, as would be expected, Maywood is a producer of thorium salts.

Pharmaceuticals and Flavors

Pharmaceuticals were originally the mainstay of the company but they have declined in importance within the past few years. Pharmaceutical products include cocaine and acetanilide as well as the previously mentioned caffeine.

The production of various aromatics, flavoring materials, vanillin, and coumarin harks back to the activities of Standard Essence Co.

Detergents

Maywood is the licensee of certain patents on the production of detergent materials called Lamepons in Germany and Maypons in the U. S. These are acid amides of such polypeptides as the degradation products from glue or chrome leather waste, and are useful for washing wool and other animal fibers. The patents, originally held by the Chemical Marketing Co., are now vested by the

SHAKE WELL WHILE USING

LIKE a genuine Indian rope trick, a new fluorescent light works without wires. Invented by James L. Cox, of the Duro Test Corp., North Bergen, N. J., the new illuminating device lights up when it is shaken. Liquid mercury acquires an electrostatic charge when it bangs against the glass, ionizes the low-pressure gas which in turn excites the phosphor. It's not very bright ("You can see it half a mile away—if you're looking for it," says Cox) but new bulb designs, employing constrictions and baffles, are improving that. First commercial prospect: fish lures.

Attorney-General. Royalty payments under these patents are running at the rate of nearly $20,000 a year.

Alox Corporation

In addition to its own production, Maywood purchased in 1934 a minority interest (39⅜%) of the common stock of Alox Corp., at Niagara Falls, N. Y. (for description of plant *see CI, Nov. 1946, p. 821*). This purchase grew out of certain parallel experiments, on air oxidation of high-molecular-weight petroleum fractions, that Maywood had conducted over the years preceding the acquisition.

CLEAN FIGHT

Synthetic detergents and soap seek specialized markets as closer competition develops.

TUMBLING PRICES for fats and oils mean cheaper soap on grocery shelves. Since about three cents of every dollar that crosses the counter is in payment for soap (including synthetic detergents), the comparative amounts of soap and synthetic detergents leaving a store in the customer's market basket is a major concern of producers.

Will lower prices for soap give it a greater share of the three-cent budget for cleanliness? Will synthetic detergents cut deeper into this melon (only two other retail grocery commodity groups outsell "soap") at the expense of soap sales? Not content to wait for next year's episode to learn how these questions are to be resolved, soap and synthetic detergent manufacturers are examining the competitive situation and writing their own scripts.

Billion in Sight

Synthetic detergents have been favored by a fortuitous marketing climate during much of their tremendous expansion since 1940. War-time shortages of fats and oils spurred much of the research that resulted in improved synthetic products. Then high prices for fats and oils that have continued (along with shortages) until fairly recently, have kept soap production costs at a relatively high level. This period has seen sales of the newer cleaners grow from roughly 10 million pounds in 1940 to last year's estimated 625 million pounds*.

Even the prospect of more normal tallow prices, however, is not expected to curtail this expansion, although eventually, the rate will taper off. This year's synthetic detergent sales may hit 700 million pounds, while a billion pound total is envisioned for 1952.

SOAP AND SYNTHETICS: An industry in her hands.

Significant in the recent trend of synthetic detergents are their gains in a period of soap sales declines. Sales of soap in 1948 by members of the Association of American Soap and Glycerine Producers, Inc. (about 90 per cent of the industry tonnage) were off 11 per cent from 1947 as non-liquid sales totaled 2,491 million pounds. Moreover, the last quarter sales were 31 per cent below the corresponding period for 1947, and 16 per cent below the 1948 third quarter. Synthetics sold by association members, however, showed a steady increase during the year—from 69 million pounds in the first quarter to 120 million pounds in the last quarter.

Keener Competition

With these figures as a spur, and cheaper soap resulting from lower raw material costs, promotional campaigns in this field so famed for advertising can be expected to gather new steam. Tallow at 9 cents a pound represents more than a 50 per cent reduction in price over last year, but it is still double the immediate prewar average. If the downward trend continues, there will be still closer scrutiny of the price and advantages of soap and various kinds of detergents for particular uses, with each gaining in its specialized field.

Of the 625 million pounds of synthetic detergents sold last year, it has been estimated that 300 million pounds were the alkyl aryl sulfonate type, 200 million pounds sulfated lauryl alcohol, 50 million pounds sulfated monoglycerides, 40 million pounds petroleum sulfonates, and the remainder the many miscellaneous types. Two-thirds of these were consumed in households and one-third went into industrial uses.

This general pattern within synthetics themselves has been fashioned in part by the relative cheapness of the base material for the petroleum-derived types. Undoubtedly some of this advantage will be neutralized by lower raw material costs for synthetic detergents that—like soap—are based on prices in the fats and oils market. But as larger volumes of alkyl aryl hydrocarbon have been consumed by detergent manufacturers, prices have been lowered (about 50 per cent for one material over 2½ years), and there is good prospect for further reductions in this area, too.

Hard Water Areas

Sellers of the synthetic products will undoubtedly concentrate their efforts in areas where they have had most success—hard-water sections of the country. Preference for soap has been indicated in soft-water areas where only about 10 per cent of the packaged soap dollar has gone to synthetics. This percentage increases with the hardness of the water,

* Sales figures refer to finished products usually containing about one-third active organic ingredient.

and in the hard-water cities, synthetic detergents have about split the market with soap products.

Advertising expenditures are also more fruitful where synthetic products have demonstrable advantages. In the past, it has cost five or six times as much to sell a hundred units of a synthetic detergent in a typical soft-water city as it has to place the same number of packages on kitchen shelves in a typical hard-water city. As the competition becomes keener, more arrows will be shot at the likeliest targets.

Changes in formulation of some synthetic materials can be expected as a result of changing market conditions. Greater attention will be paid to the development of new combinations of builders and auxiliaries that will permit a lower content of synthetic detergent and a lower sale price without loss of efficiency. Such trends will probably be most evident in heavy-duty synthetics sold in soft-water areas, but heavy-duty products with the usual percentages of active synthetic ingredient will be relied on to sell themselves in hard-water areas at a premium price if necessary.

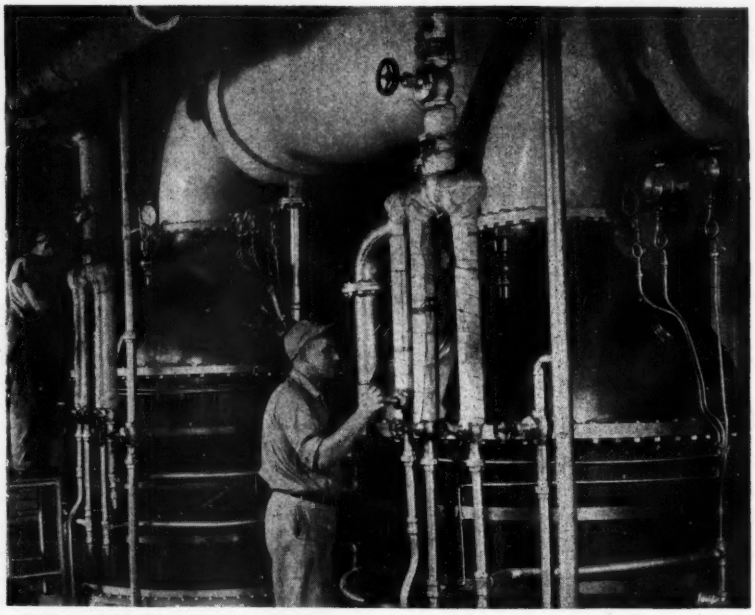
More Cleanliness to Sell

The immediate prospect of a sharper contest in supplying cleaning materials does not mean producers think the boundaries of this market have been set or even sighted. Rather it heralds a period in which both soap and synthetic detergents will widen their domains by exploitation of their particular virtues in fields they can best serve.

The industry is confident that the sales possibilities in outlets such as street cleaning, house exterior washing, home dish and laundry washers, and various food processing and food handling establishments have been almost overlooked in some cases and poorly developed in others. In satisfying this latent demand, and further developing markets that already exist, better formulated soaps and synthetic detergents can be expected, as well as new synthetics for special uses. The housewife may then spend four cents or a nickel for "soap" out of every dollar she leaves at the grocery.

RESIN DETERGENTS

PHENOL-formaldehyde resins can be converted to detergents, according to the disclosures of several U. S. patents (Nos. 2,454,541-5) assigned to the Rohm & Haas Co. The alkylphenol condensation product is made water-dispersible by adding several moles of an alkylene oxide. The terminal hydroxyl may be sulfated, sulfonated, or carboxylated.



CASCARA EVAPORATORS: Twenty-three is better than a hundred.

SPRAY-DRIED CASCARA

Soluble cascara concentrate saves on shipping, is immediately usable.

TIME WAS when a mortar and pestle, and maybe a couple of fancy-looking retorts, were all the equipment a drug producer needed—and a chemical engineer around the premises would have been regarded with a mixture of curiosity and suspicion.

But those days have gone the way of the two-bit haircut, and nowhere is the change more markedly exemplified than at the Chehalis, Wash., plant of I. P. Callison & Sons. There modern chemical engineering tools are utilized in a new process for making soluble powdered cascara concentrate.

Pacific Northwest Sole Source

Importance of the new process may be gathered from the fact that the Callison firm is the largest supplier in the world of that drug. The Pacific Northwest is the only commercial source of that bark, and last year Callison handled 70 per cent of the region's volume of 4.5 million pounds.

Until January of this year, when the new process went on a production basis, the firm shipped the raw, ground bark to pharmaceutical manufacturers. The soluble powdered concentrate offers less of a shipping and storage problem, plus being ready for immediate use by drug manufacturers.

Callison receives the raw bark as it is stripped from the trees, grinds it, sacks it, and ages it for one to two years in a storage room. When the bark is to be processed it is placed in a mixing vat and enough water added to dampen it. If the buyer specifies a debitterized product, magnesium oxide (12%) is added and the dampened bark is spread on a concrete floor for 24 hours to complete the debitterizing action.

In the Percolator

The mixture is then placed in an 800-pound-capacity percolator where it is held for two hours while steam is introduced under negligible pressure to keep the water at 212° F. The water goes in the percolator at the top and is drawn off at the bottom as a thin percolate which is piped to a holding reservoir. From here the percolate goes to evaporators which reduce it to 25 per cent solids and moves on to a Sharples centrifuge which removes insoluble solids.

From a holding tank the mixture is pumped to a Gray-Jensen spray drier unit, similar to that used in the powdered coffee and whole milk industry. The pump is a Manton-Gaulin product operated at a pressure of 3,000 to 4,000 p.s.i. Forced through the atomizing nozzle into the stainless steel chamber, the mixture is subjected to air at 300° to 350° F. which enters from the sides of the chamber at 7500 c.f.m. The moisture is evaporated almost instantaneously. The solids fall into an eight-inch stainless steel pipe whence they are blown by a fan into a smaller cyclone chamber where they are separated from the air. The exhausted air

from the first chamber passes into the second one and then to a fines collector where one to two per cent solids are recovered.

The powdered concentrate is packaged in wooden barrels of 50-, 100-, and 200-pound capacity, having moistureproof lining. One hundred pounds of the raw bark produces 23 pounds of concentrate. Two types are offered, the natural, or bitter, and the debitterized.

The importance of the concentration process is magnified by the distance of the cascara source, in the Far West, from the major markets, in the East. Two thousand tons times seventy-seven per cent weight saving times three thousand miles adds up to a lot of ton-miles.

FAST RUBBER

"Dioxes" cut cold rubber polymerization time from hours to minutes.

WHEN members of the Washington, D.C., Rubber Group met recently to hear a talk on the status of cold rubber they settled back comfortably in anticipation of a good general summary of what was going on in the field. But speaker W. S. Reynolds of Phillips Petroleum Co. gave his audience more than it bargained for. He left it wide-eyed and guessing about a brand new series of GR-S redox polymerization oxidants called "Dioxes." —wide-eyed at the results they were achieving, and guessing as to what their chemical nature might be. If claims for them are true, they may revolutionize again the already often-revolutionized rubber industry.

Masked Marvel

Although the identity of the Dioxes is being kept a well-guarded secret, their accomplishments are not. Phillips, in whose laboratories they were developed, claims it has succeeded in achieving the standard 60% conversion for 14° F. GR-S rubber in only 75 minutes with Diox as compared with 13 to 16 hours with the present commercially-used cumene hydroperoxide oxidant. For —4° F. rubber, Diox cuts the reaction time from 25-30 hours down to less than five hours.

But that isn't all. Diox systems, according to Dr. Reynolds, also make it possible to polymerize directly to high-solids latices. This means less volume of material must be handled in the process.

Still another major claim is the ability to use less pure—and consequently cheaper —butadiene and styrene. Present commercial GR-S plants pay as much as 0.2¢ a pound to get their butadiene from 92% purity up to the 99% now required.

The Dioxes are used in essentially the same way as cumene hydroperoxide in the redox polymerization catalyst and involve only minor changes in the present catalyst recipe. They also permit the use of commercially available rosin soaps in the emulsion system.

More Heat, Too

Other cold rubber experts do not doubt the Phillips reports, even though they have yet to get so much as a glance of either the oxidant or the rubber made with it. (Phillips is releasing no samples until it is sure of its patent position.) But they do point out several major problems that high-speed oxidants such as the Dioxes face in going to commercial-scale application.

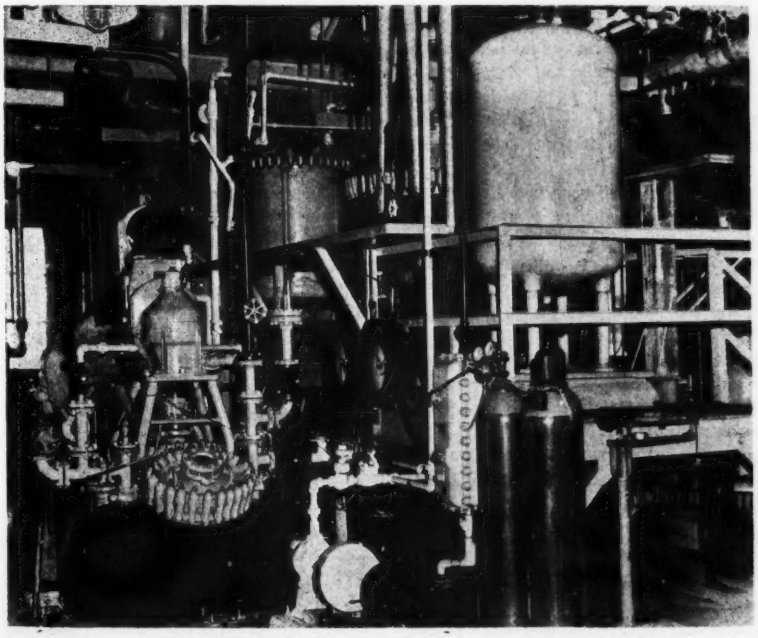
One is that the polymerization kettles in existing GR-S plants are designed with only 256 sq. ft. of cooling surface. That isn't enough to handle the rate of heat evolution from a reaction time of much less than 11 or 12 hours. A kettle of the same size capable of handling the fast Diox reactions would probably need about 1,000 sq. ft. of cooling surface.

Another question raised by Diox is whether there would any longer be need for a polymerization plant at each butadiene location, as is now the case. Because a 75-min. reaction would increase throughput capacity of the polymerization kettles about ten-fold, it might be preferable to operate fewer co-polymer plants and collect the butadiene and styrene from several locations for one plant.

Plans Indefinite

Thus far Diox rubber has been produced in nothing larger than a pilot plant. The next step will be more thorough cost studies and evaluation of the rubber under actual road conditions.

There is no indication as yet that Diox will cause any early change in the program now under way to convert approximately 200,000 long tons per year of the company's synthetic rubber capacity to a 41° F. product at 13-16 hour reaction time—the present commercial "cold rubber." However, Phillips believes that even in these plants Diox can lower the cost of the rubber by permitting use of less costly ingredients. Some time will be required, it admits, to take full advantage of the new rapid reactions through plants specially designed and constructed to handle them.



DIOX SYSTEM PILOT PLANT: Colder rubber faster.

DEARER BRAINS

CHEMICAL engineering has edged into the lead as the engineering field offering the highest average starting salary, according to a survey of 365 June, 1948, graduates of New York University's College of Engineering.

The average for the whole class was $252 a month—$25 over the 1947 figure. Data for the six major fields averaged out as follows for the 177 who replied:

Field of Engineering	*1948*	*1947*	*% Increase*
Chemical	$264	$235	12
Mechanical	256	228	12
Civil	255	235	8.5
Electrical	251	238	5.5
Aeronautical	245	211	16
Administrative	230	198	16
Average	252	227	11

BORON TO CRESOL

Cresol first product scheduled for new synthetic alcohol process.

THE CLINGING odor of cresol and a steady stream of visitors characterize the Newark, N. J., facilities of United International Research, Inc., these days. The former emanates from a laboratory demonstration unit to prepare cresol by a new synthetic process; the latter is composed of chemical scouts checking on this process that may mean cheaper aliphatic alcohols as well as the aromatic product in immediate prospect.

Al Globus, director of research and president of the organization, started it

A. R. GLOBUS: Cresol first.

all with his efforts to prepare elemental boron a few years ago. In the course of his work, he prepared some organic derivatives of boron that gave interesting reactions with other organic compounds. When he found an organo-boron compound that reacted with an aromatic or aliphatic hydrocarbon to form a complex which could be hydrolyzed to the corresponding alcohol, boron was forgotten as the objective, and he concentrated on developing such a process. Now, two years later, commercial production is in sight.

Catalyst the Key

Key to commercial adaptation of the process is recovery of the catalyst. Toluene vapors are bubbled continuously into a reaction vessel containing the boron compound and sulfuric acid maintained at a temperature below 200° C. During the induction period, toluene is absorbed by the solution at a rapid rate; then as three molecules of toluene form a complex with the boron compound, toluene vapors serve as a cooling medium for the exothermic reaction. Water, which separates out from the catalyst, is distilled off continuously with the toluene. After separation from the water, this toluene is returned to the system.

At the completion of the reaction, the toluene-boron complex is hydrolyzed with steam or boiling water to yield a mixture of about 80 per cent para-, 10 per cent meta- and 10 per cent ortho-cresol. Final separation of cresol from the hydrolysis mixture is aided by stirring in some toluene. After washing, the toluene and cresol are separated by fractionation, and water-white cresol above USP standards is obtained as product. Yield is 80-90 per cent of cresol, with a residue of cresol-resorcinol that may have pharmaceutical uses. Recovery of catalyst is vital to low-cost operation of the process, and this is accomplished with a loss of but 4 per cent.

Plant to Come

Globus is one of the principals in Hydrocarbon Chemicals, Inc., a new company that has been formed to build an 8,000-12,000 lb.-per-day plant to produce cresol by this method.

The unit, to cost about $200,000, will consist of five 100 lb.-per-hour reactors, each representing an 80-fold jump from the 30 lb.-per-day laboratory set-up in which the process was developed. Heat dissipation during the formation of the toluene-boron complex is the limiting factor on the size of the batch, and development work has indicated that a 100-lb.-per-hour capacity is the maximum size at which close temperature control can be achieved.

A site in the Newark area is being selected, with construction to begin within a month, and production expected within six. Equipment will be of mild steel, with the exception of the distillation unit, which will be glass-lined to preserve purity of product.

One cresol consumer has already contracted for as much as 4 million pounds the first year, although the plant will be rated at about 3.2-3.6 million pounds a year. Globus has been approached by many people interested in plants for cresol, higher aliphatic alcohols and phenol, but his big interest of the moment is to get the first plant in and see how things go. Five additional plants are contemplated, but the new company is rather uncertain as to how they will be financed.

Cresol has been short for so long that it is difficult to find a true picture of the market for it, but Globus feels that an additional 40 million pounds a year can be sold. Although the supply situation has been easing, there probably is that much demand for the high-quality product he obtains. Cresol from petroleum sources has a sulfur content that makes it unsuitable for many uses, and the new product will have preference over it. Moreover, the synthetic material can be produced at a lower cost than the natural. It will be offered at market price, but could profitably be reduced as much as 25 per cent.

Higher Alcohols

Production of higher aliphatic alcohols is viewed as the most likely variation to be undertaken after the cresol units are installed. Since they require more strenuous conditions than the ring compounds, a plant designed for cresol manufacture could not be operated with aliphatics as the feed stock, but the reverse would be possible. Globus has his sights on making first C_8-C_{10} alcohols, and then higher ones up to C_{16} from selected naphtha fractions, and he thinks he can market them at about one-half the going price. In fact, he feels that there are greater potentialities in such manufacture than in cresol.

Phenol is another good possibility, and one company is interested in it. Although Globus thinks he can beat the standard processes on price, he does not want to take on such a competitive field as a starter. If his cresol venture pans out as well as he hopes, undoubtedly the cresol odor in his lab will be mingled with many others.

AMMONIATED ROSIN

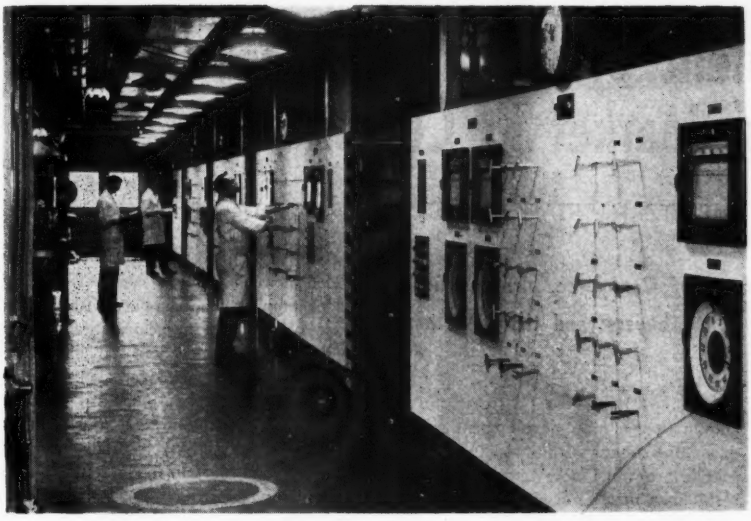
High-molecular-weight amine derived from rosin going into large-scale production.

DOWN in Hattiesburg, Miss., a Hercules pilot plant has been turning out a rosin-derived amine for over two years. The new compound has been put through its paces, pronounced fit for competition; and just last month (*CI Newsletter, February 1948*) Hercules Powder Co. revealed that large-scale production will commence this Spring.

Rosin Amine D, as Hercules has dubbed the newest addition to its terpene family, is made by treating disproportionated rosin acid with ammonia to yield the corresponding nitrile, which is subsequently hydrogenated. Disproportionated rosin is best, for the reactions with it are accompanied by very little decarboxylation.

Easy to Handle

Rosin Amine D is a pale yellow, very viscous liquid containing 90-95% of primary amines. The remainder consists of the non-acid fraction normally present in rosin together with some decarboxylation products. It is almost insoluble in water



HERCULES HIGH-PRESSURE LAB.: After the paces, a pronouncement.

(0.5%), soluble in organic solvents, and compatible with most resinous products.

Although it darkens upon heating for long periods, it can be stored at room temperature in metal containers. Like other high-molecular-weight amines, rosin amine and its derivatives are toxic when taken orally and irritating to the skin. In low concentrations, however, they are relatively safe to handle.

Many Applications

Rosin amine is expected to make its way in many fields where high-molecular-weight amines have proved useful. The acetate and hydrochloride salts (among the more water-soluble) look promising as flotation agents for non-metallic, siliceous ores and certain sulfide ores. The amine itself and certain of its salts may be used in the rubber industry as accelerators, reclaiming agents, adhesion promoters, and emulsion polymerization aids.

In the petroleum industry the amine and its salts show promise as emulsion breakers, corrosion inhibitors and drilling mud preservatives.

Not to be overlooked are the fungicidal and disinfectant properties of the compound and its salts. Some of the water-soluble salts have high phenol coefficients, and several are effective preservatives for starch, casein, and glue.

Of general industrial interest are the amine's rust-preventive, antioxidant, and adhesion-promoting characteristics.

Low Cost Indicated

Although Hercules hasn't indicated the selling price of rosin amine, it seems likely that the new material will be a strong contender costwise among competitive amines. Rosin has been relatively immune to recent years' price-hiking pressures; and Hercules' decision to go ahead bespeaks the opinion that it may stay that way.

SHELLS AND HULLS

Comparative analyses point up potential uses as industrial raw materials.

RELATIVELY little attention has been paid to the profit possibilities in nut shells, fruit pits and seed hulls. Yet these agricultural residues are available in large volume, are very cheap, and possess some unique physical and chemical properties. Informed estimates place the annual accumulation of the materials at processing plants at roughly 1.5 million tons of seed bulbs, some 100,000 tons of nut shells, and a like quantity of fruit pits.

To G. H. Nelson, L. E. Talley and S. I. Aronovsky, chemists at the U. S. Department of Agriculture's Northern Regional Research Laboratory, Peoria, Ill., this looked like a fertile field for digging. Moreover, growers and trade associations were anxious to find new uses for something that many of them were throwing away, or wanted to and couldn't without going to some expense.

Comparable Data

The Peoria researchers have not found the new uses, but they have laid what may well be the groundwork for them. On a number of the materials, they have recently completed the first analyses ever to be carried out on a truly comparative basis. While chemical data on some have been available before, they have been obtained by so many different methods that it has been almost impossible to compare them.

The new analyses offer some interesting comparisons:

The ash content of practically all of the seed hulls was found to be much higher than that of the nut shells or fruit pits, usually two to four times as great. The silica content of the ash from the seed hulls was generally the highest, ranging from 20 to 96% as against 2 to 52% in the nut shells and fruit pits. This characteristic of rice hulls is what makes them a good soft-grit cleaning agent for metals.

The seed hulls contained considerably more nitrogen than either the nut shells or fruit pits. Soybean, peanut, Cuban castor bean, and sunflower seed hulls had particularly high nitrogen contents, corresponding to 7.6 to 9.9% protein. These high-protein hulls are a possibility for seeds.

With the exception of peanut, castor bean, and soft shell almond hulls, and the date pits, all of the materials were high in pentosans. Oat hulls, which topped the list, are used for the commercial production of furfural. Other high-pentosan materials, such as sorghum (Leoti) hulls, almond and coconut shells, and apricot and peach pits, are suggested by the researchers for possible similar use.

The cutin content of the materials varied over a range from 0 to 12%, with black walnut and filbert shells and domestic castor bean hulls showing the highest figures. The cutin generally obtained was a pale yellow or white material with a waxy appearance.

On ligin content, domestic castor bean hulls were highest with 60%, and pecan shells next with 46%. The rest of the seed hulls, however, were generally lower in lignin than the nut shells and fruit pits.

With the new Department of Agriculture data, both producers and potential customers of these cheap agricultural residues will have a sound basis for future work.

CASTOR BEANS: More lignin, fewer pentosans.

Department of Commerce Sees Buyers' Market in Chemicals

EDITORIAL STAFF REPORT

LATE LAST YEAR, says the Department of Commerce, the chemical supply-demand scales tipped in favor of the buyers; and that situation will continue in the current year.

IN ITS just-issued "Outlook for Chemical Industry in 1949" the U. S. Department of Commerce pointed out that supply of most chemical commodities improved to such an extent during the latter part of 1948 as to constitute a shift from a sellers' to a buyers' market.

"At the beginning of 1949, the chemical industry's production for the most part, had come abreast of demand, and manufacturers were beginning to seek additional markets for their output," said the study. Continuing, the forecast said:

"A review of the current situation indicates that with a few exceptions chemicals are in adequate supply. Those exceptions include nitrogen fertilizers or other chemical products involved in those national or international policies which influence the normal forces of supply and demand. Certain chemical specialties are in short supply, but installation or conversion of facilities will improve conditions.

"Foreign trade in chemicals also will affect the domestic situation, but it is not possible to predict the magnitude or whether the present pattern is a permanent or a temporary one. The removal of Germany as a major producer of chemicals has disturbed the prewar patterns of trade. The need for dollar exchange and the assistance of the Economic Cooperation Administration may influence considerably the pattern of exports and imports of the immediate future."

The record expansion program of the chemical industry, including conversion of surplus war plants, will reach its peak in 1949, said the department. Perhaps the largest phase of this expansion during the year, it was said, will be in connection with the synthesis of hydrocarbon products from petroleum and petroleum gases (*CI, March 1949, p. 377*).

This postwar expansion "has pretty well met shortage problems" it was stated, but most plants and production facilities are operating close to capacity and must continue to do so to keep ahead of demand.

"Any unforeseen emergency, or sudden culmination of the development of new products coming from widespread research programs now under way, could result in a new vigorous increase in construction of new facilities in special fields," the department added.

ALKALIES AND CHLORINE

The output of alkalies, soda ash, and caustic soda, probably will be ample to meet all domestic requirements and to enable United States producers to seek their share of foreign markets. Demand for chlorine will utilize the full output of present facilities and proposed expansions. Operation of these facilities will insure a large supply of electrolytic caustic soda, which is expected to maintain its lead over the lesser quantities produced from soda ash.

Caustic potash and carbonate will continue in balance.

CARBIDE AND COMPRESSED GASES

Demand for calcium carbide for acetylene during 1949 probably will utilize full production facilities to meet requirements of metal cutting and welding operations and the chemical industries. Availability of power will limit production.

Solid carbon dioxide will continue to be in heavy demand as a refrigerant for perishable goods and for use in the beverage industry.

Consumption of hydrogen for welding and in chemical hydrogenation processes will remain in good volume during 1949.

New production facilities will come in during 1949, both for producing 99.5 percent oxygen, for use in the welding, cutting and other steel-fabricating operations, and for producing the 95 percent grade, used in the manufacture of steel and chemicals. These should meet the expected increased demand.

Liquefied petroleum gases (propane-butane) requirements for domestic and industrial fuel consumers during the past 4 years have increased 30 percent per annum until "LPG" has become a 2-billion-gallon-pear-year business. This increase should continue during 1949, provided new production facilities and cylinder supplies can keep pace with demand, especially during the peak winter months.

Refrigerant sales will be maintained in keeping with the increasing interest in food preservation, chemical refrigeration and air conditioning and with the added use of methyl chloride, methylene chloride, and the fluorinated hydrocarbons as impelling agents in the growing aerosol industry

CHLORINATED HYDROCARBONS

The chlorinated hydrocarbon solvents should be in good demand during 1949 for metal degreasing, dry cleaning, and as intermediates.

The use of perchlorethylene is making considerable inroads on carbon tetrachloride as a dry cleaning solvent. One new producer has signified his intention of manufacturing perchlorethylene sometime during 1949. Use of trichlorethylene for metal degreasing should continue at approximately the 1948 rate. Use of trichlorethylene in extraction should continue but probably in lesser volume.

OTHER INORGANIC CHEMICALS

The 1949 outlook for sulfur is that producers will be able to meet both domestic and export requirements at the same rate as in 1948 or with possible increases if called upon to do so. Sulfuric acid manufacturing capacity will increase slightly in 1949, when facilities

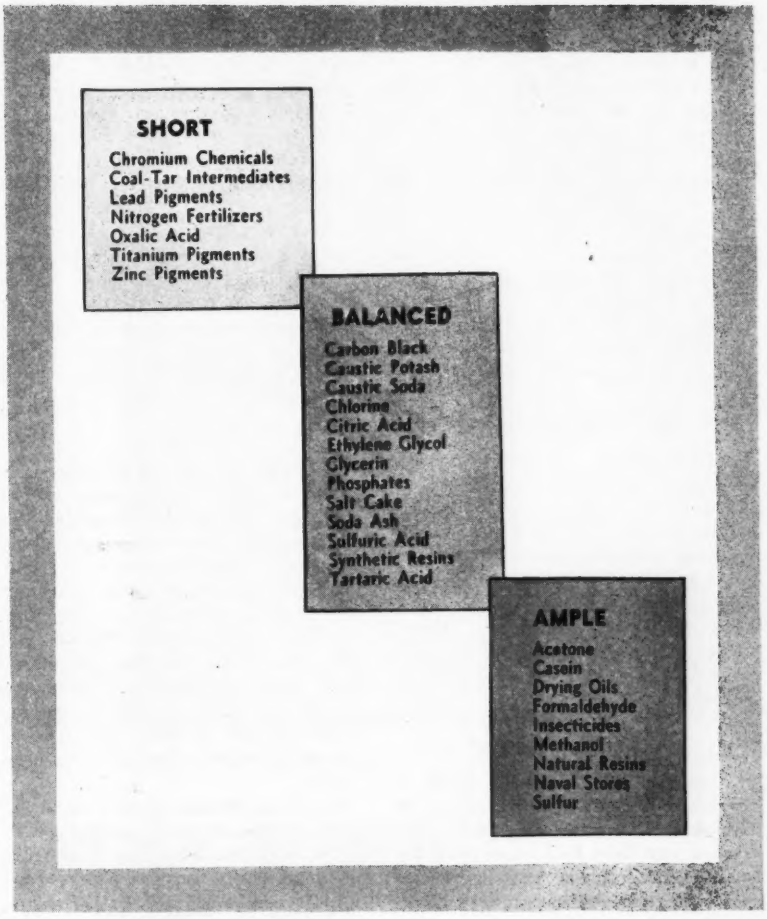
Chemical supplies are becoming ample.

now being installed are completed. Consumption should increase somewhat over the previous year, especially for fertilizer materials.

Chromium chemicals continued in short supply throughout 1948. Conditions should improve in late 1949, when additional facilities now under construction are scheduled to begin production.

Phosphates, which were in short supply in early 1948, have shown steady increases in production throughout the year. Some new facilities for phosphorus, phosphoric acid and phosphates started operation in 1948, and others should be completed in 1949. This additional capacity, together with the improved alkali supply, should provide an ample supply of sodium phosphates, phosphoric acid, and other industrial phosphates. Salt cake production showed some increases in 1948. New production in Canada and decreased use per ton of pulp in the kraft paper industry are expected to bring about better balance in the over-all salt cake supply.

Hydrochloric acid output is expected to continue at about the same rate in 1949. Hydrofluoric acid production improved steadily in 1948, and it is anticipated that the demand in 1949 will continue at a good level.



ORGANIC CHEMICALS

The organic chemical industry was no exception to the almost fantastic expansion in the over-all chemical productive capacity which took place in the United States during 1948. There now appears to be some concern whether certain of the unfinished capacity (formaldehyde, methanol, and acetone) should be brought into production at this time.

This new capacity is found chiefly in the synthetic production of the lower aliphatics from raw materials relatively independent of natural resources. The following table shows the extent of such capacity increases in relation to selected previous periods.

ANNUAL PRODUCTION VOLUME IN MILLIONS OF POUNDS

Commodity	*1935-40*	*1942-45*	*1948*
Methanol[1]	180	393	1,035
Formaldehyde	75[2]	500	625
Acetone	100	330	430
Ethylene glycol	90	175	350

[1] Includes natural.
[2] Data for 1939-40 only.

At the new year, with certain exceptions (notably glycerin, ethylene glycol, and a few dyes), consumer demand shows signs of beginning to weaken. Since prices of chemicals have not increased in line with those of other comparable soft goods, it is anticipated that any price cuts will not be substantial. An important factor is the lower cost of labor in relation to the total cost of manufacturing chemicals even though this is offset somewhat by a higher obsolescence rate. This results in an extreme sensitivity to raw materials costs. How it functions is well illustrated by the effect of the drastic price adjustment (40 percent reduction) in butyl alcohol during the fourth quarter of 1948, when a reduction was made in molasses cost. Such reactions may be anticipated for such other items as are dependent upon sensitive raw materials. However resistance may be maintained during the first half of 1949.

ETHYL ALCOHOL

The industrial alcohol market, which was unsettled at the year's end, is not expected to stabilize before the second quarter of 1949. It is thought that by that time the price will be firmed at around $0.40 per gallon. Meanwhile, some fermentation producers using molasses are reported to be delaying their completion of purchase agreements for the 1949 Cuban supply now estimated at 250-275 million gallons.

COAL-TAR CHEMICALS

Coal-tar chemicals are expected to continue in short supply throughout 1949, unless there is a marked retraction of purchasing power.

While 1949 installation of new ovens will provide another 3 million tons per year of coal-carbonizing capacity, that amount will not be entirely additional, for part will balance a number of old ovens in need of replacement.

Products obtained from the light oils are expected to be in better position than those from the coal-tar fraction. Coal-tar distillation in 1949, is expected to be slightly below that of 1948, because of large supplies of creosote and high fuel prices.

New capacity and higher operating rates for intermediate will utilize any additional coal tar crudes produced in 1949.

NATURAL ORGANIC CHEMICALS

A new citric acid producer-plant is mentioned for 1949. For the present, its output will be consumed at the source. Regularly established production of citric acid is adequate to supply current demands.

Tartaric acid supplies of both imported and domestic grades are expected to remain in balance with demand.

Oxalic acid production, on the other

hand, will enter 1949, at a rate considerably below demand with no increased production in sight.

The unusually small domestic production and demand for casein exhibited in 1948, is expected to continue in 1949, until a price reduction to competitive levels is effected. A final price of $0.17 to $0.18 per pound, which is about half current quotations, is reported as necessary to revive consumer interest.

Prices for Argentine casein are pegged at $0.215 a pound with European markets showing increased interest. United States stocks and production should be able to satisfy anticipated 1949 demands.

SYNTHETIC DETERGENTS

The importance and uses of synthetic detergents are expected to increase and, as their use becomes more widespread in the household, they will afford increasing competition to soap (*CI March 1949, p. 381*). Increases in the supply of fats and oils together with the lower prices will permit greater competition of those synthetic detergents derived from animal sources with those derived from petroleum.

FERTILIZER MATERIALS

Phosphate was in ample supply in 1948, and is expected to continue to be available in adequate quantities in 1949. Potash was short but probably not too much so. The supply increased in 1948, and will be increased still more in 1949. Nitrogen demand, particularly as reported by fertilizer producers, seems to be insatiable.

During the fertilizer year ended June 30, 1948, just short of 1 million tons of nitrogen were made available to agriculture, of which about 65,000 tons were exported in accordance with an international agreement. The net supply therefore, was approximately 934,000 tons. In the current fertilizer year this net tonnage is expected to be increased to over 1 million tons and in the year 1949-50, to nearly 1,150,000 tons. During the year 1948-49, the Army will supply about the equivalent of the export program. The 1949-50 figure above, however, does not include any Army production nor does it provide for any export. It is assumed that, if necessary, the Army will supply at least the equivalent of the export program.

Imports, from Canada and Chile particularly, have been curbed somewhat by international agreement on fertilizer materials. The most promising source of additional nitrogen, however, is synthetic ammonia production. Commercial producers, since the war, in addition to the operation of certain war-built plants, have increased and are continuing to increase their capacities. At the present investment cost of $300 per annual ton of ammonia, however, there is some hesitancy about further increasing the investment. By the middle of 1949, the Army will have under its control about 400,000 tons of ammonia capacity, some or all of which will later compete with the present producers. Industrial uses received about 25 percent of the total nitrogen supply in 1947-48. The agricultural demand is affected to some extent by farm-product price support.

The increase in agricultural demand for nitrogen exceeds by far the increases in demands for other basic materials by consuming industries. It would be very difficult at this time to predict the future of nitrogen.

INSECTICIDES

The supply of chemicals for insecticides should be ample to meet requirements in 1949. This is particularly true of the synthetic organics (benzene hexachloride, chlordane, chlorinated camphene, parathion, etc.) for which additional facilities have been or are being built. Output of DDT fell off sharply in May of 1948, but picked up in the latter part of the year.. One factor which may affect the demand for DDT in 1949, is the reported resistance of flies in some areas to the residual killing effect (*CI, Jan. 1949, p. 33*).

Pyrethrum acreage has declined in the past year because of unfavorable prices in the world market. This decrease in pyrethrum supply, combined with resumption for uses which had been more or less supplanted in the last few years by the synthetic organic insecticides, could result in a tight supply situation during the coming season.

Because of lessened demand, a drop in prices, and additional cost of labor, collection of rotenone-bearing roots in South America declined somewhat in 1948. However, it is expected imports during 1949 will meet demand, providing supplies are received in time for grinding and distribution.

Raw materials for the manufacture of lead and calcium arsenate are sufficient for production requirements, with prices continuing at high levels. Copper sulphate output is expected to be adequate although the supply of copper metal is considered short.

PAINTS

Prospects for increased sales of paint products are bright for 1949, and the record sales volume of paint products attained in 1948, should be surpassed. Trade sales should expand during the new year as a result of the volume of new construction, the large backlog of maintenance and repair work which is continually increasing and greater appropriations for national defense and housing.

Raw materials utilized in the manufacture of paint products will continue in heavy demand. Supplies, with the exception of chemical pigments, will be adequate. Prices of chemical pigments and dry colors probably will increase.

Production of lead pigments will increase somewhat, but heavy demand for these pigments, coupled with the shortage of pig lead, will result in a supply below domestic requirements. While output of zinc pigments will be higher in 1949, supply of zinc oxide pigments will be below domestic needs. Production of titanium pigments is expected to show little expansion during the year and supplies will be insufficient due to large domestic demands for them as replacements for lead and zinc pigments in paint formulations. Prices of lead and zinc pigments tend to follow closely the prices of the metals.

In the field of dry colors, carbon black sales will expand with increased quantities consumed by domestic and foreign markets. Production of carbon black will be higher in 1949, with furnace black consumed in greater quantities and replacing contact black in some uses (*CI, Jan. 1949, p. 40*). Supplies of both will be more plentiful but there is a possibility that prices will advance due to increased costs of production. Production of chromium and cadmium colors will expand somewhat. Sales will increase with improved supplies. Good markets should continue for natural red oxide of iron, and synthetic black, brown, and red iron oxides and supplies of them should be sufficient. Prices of oxides should not materially change.

Drying oils are in a better supply position than any other group of paint raw materials. Record domestic crops of flaxseed and soybeans in 1948 should provide ample supplies of these two oils. Demand for drying oils should continue strong throughout the year. Possibly imports of tung oil will not reach the high volume attained in 1948, due to unsettled conditions in China, but stocks, supplemented by domestic production, should be sufficient for requirements. Supplies of dehydrated castor oil and oiticia oil should be ample. Higher production of fish oils should be attained during 1949. Although prices of drying oils are not expected to fluctuate widely, a slight downward movement in prices for all oils is not improbable.

Indications point to a larger market for naval stores in 1949. Domestic consumers of turpentine and rosin should expand their purchases and a better export market should develop. Supplies are sufficient to meet increased demands and prices are not likely to show any wide changes during the year.

Supplies of shellac and natural resins should be ample with imports continuing to increase. Increased demands for these commodities may be expected, particularly if prices are lower.

(*Turn to page 510*)

Chain-reacting pile "complex" of the Brookhaven National Laboratory, Upton, N. Y., is a $20 million addition to the AEC's facilities.

ATOMIC ENERGY IN INDUSTRY
A Progress Report

by W. I. THOMPSON,* Atomic Energy Division
The H. K. Ferguson Co., New York, N. Y.

DIRECT BENEFITS FROM THE APPLICATION of radioisotopes, produced by atomic fission, are being added to the many indirect benefits which industry has received from developments necessitated by the war-time atomic energy program.

IN many ways the story of atomic energy in industry is the story of a by-product which is showing signs of becoming the main product. The atomic bomb justified the original expenditure for atomic development and any industrial benefits should be looked on as unexpected dividends. These "extra dividends", however, in the long run may total more than the initial return.

Since the War there has been a continuous effort on the part of the Manhattan District, and, later the Atomic Energy Commission, to encourage industrial activity in this field. Now is a good time to take stock, see how industry has been able to participate, and assess the present commercial importance of atomic energy.

PRESENT STATUS

Commercial development in atomic energy today is so intimately connected with the government program that any discussion of it must start with a brief summary of the Atomic Energy Commission's activities. Some of these are purely military in nature but many will lead to genuine peace-time commercial developments. Ultimately the "atomic energy business" should exist without the crutch of military necessity. This question is not critical at present as a strong government program is in operation and will, in all probability continue for some time to come.

The government's construction program[1] now underway, will cost about one and a quarter billion dollars and take several years to complete. More than half is for new production facilities and improvements and additions to existing plants. About a third is for new housing and replacement of sub-standard housing, built during the war at atomic energy plants. The remainder, about twelve per cent, is earmarked for new research laboratories.

Such an extensive program involves

* Assistant Technical Director

SOME RADIOISOTOPES AVAILABLE FROM THE ATOMIC ENERGY COMMISSION

Element	*Atomic Number (Number protons)*	*Mass Number (Total number particles in nucleus)*	*Half-life (h = hours d = days y = years)*	*Type of Radiation A = Alpha particles B = Beta particles C = Gamma rays*
Antimony	51	122	2.8 d	B, C
	..	124	60 d	B, C
	..	125	2.7 y	B, C
Carbon	6	14	5100 y	B
Cerium	58	141	28 d	B, C
	..	143	33 h	B, C
	..	144	275 d	B
Cobalt	27	60	5.3 y	B, C
Gold	79	198	2.7 d	B, C
	..	199	3.3 d	B, C
Iron	26	55	4 y	C
	..	59	44 d	B, C
Phosphorus	15	32	14.3 d	B
Potassium	19	42	12.4 h	B, C
Sodium	11	24	14.8 h	B, C
Strontium	38	89	55 d	B
	..	90	25 y	B
Tungsten	74	185	77 d	B
	..	187	24 h	B, C

many firms, and makes new demands on suppliers of special equipment such as pumps and instruments, and on the producers of special materials such as new alloys, plastics, and chemicals. For example, the shielding of nuclear reactors requires new techniques in the use of concrete and other inexpensive radiation absorbers. Piles of the Hanford type require large amounts of very pure graphite which must be machined to extremely close tolerances. Newer piles which are being designed introduce unusual problems in the metallurgy of beryllium, uranium, and other metals of low thermal neutron absorption such as aluminum, magnesium, zirconium, and zinc.[4]

The effect of this program can be gauged somewhat by considering the effect of the war-time atomic energy program. Construction of the huge K-25 separation plant at Oak Ridge involved production of new fluorocarbon plastics, such as polytrifluorchlorethylene, which are finding many uses because of their great heat and corrosion resistance. Methods of tight welding, leak detection and clean assembly had to be worked out on a large scale to make this plant feasible. Because of the special nature of much of this work, the effect of the expenditure on certain portions of industry is greatly exaggerated when compared to its overall impact upon industry. When these new techniques and materials are made readily available to industry in general, their importance may be more properly assessed.

URANIUM SUPPLIES

The course of atomic energy will be greatly influenced by the amount of uranium which is available. The Atomic Energy Commission is encouraging development of domestic sources and has established a three-point program to encourage prospecting[2].

1. Government-guaranteed ten-year minimum price for domestic ores containing uranium as U_3O_8.

2. A bonus of $10,000 for the production of at least twenty tons of uranium ore or concentrates assaying twenty per cent or more U_3O_8 from a new deposit.

3. Government-guaranteed three-year minimum prices for low-grade carnotite and roscoelite type uranium-vanadium ores of the Colorado plateau area and Government operation of two vanadium-uranium plants in that area.

This program has stimulated prospecting activity which has already yielded dividends. The recent strike in the Old Caribou Hill Mine in Colorado is indicative of such opportunities for development in the mining field.

POWER

There is little immediate prospect for industrial power from atomic sources. The study[3] of the economics of nuclear fission as a source of useful power, which formed the basis of the Baruch Report on atomic energy to the United Nations showed definite potentialities. Progress in the two years since the report was made has not been very encouraging. Although the Commission has recently stepped up its program for power development, power from atomic energy is some years away. Eventually power production may be the main function of atomic energy and will provide other concomitant benefits as the military program is now doing. Any present industrial interest in atomic energy must be based on this ultimate promise.

RADIOISOTOPES

The picture in the radioisotope field is considerably brighter. Most applications are in fundamental research with no immediate practical end in view. However, an appreciable fraction is strictly of a dollar-and-cents nature. Of a total of three thousand shipments of radioisotopes from Oak Ridge, about ninety were for industrial research. Projects ranged from the development of a thickness measurement gage to a basic study of the mechanism of the Fischer-Tropsch hydrocarbon synthesis reaction.

About a hundred radioisotopes are available through Commission facilities, and a growing list of labelled chemical compounds is being made available through Commission facilities or through private laboratories licensed by the Commission. In the distribution of these radioisotopes the Commission attempts to restrict their use as little as possible. The cost is nominal and aid in setting up laboratory facilities and training in the use of radioisotopes is readily available*.

Labelled chemical compounds greatly simplify certain chemical analyses. In ordinary quantitative analysis the constituent to be determined must be separated *completely* and in *pure form* from a known weight of the original mixture. However, if the constituent is available in labelled form, a measured amount is added to a known weight of the mixture and a *small amount* of the pure constituent is separated. By means of a radiation count the ratio of labelled to

* The Oak Ridge Institute of Nuclear Studies offers a series of courses in "Techniques of Using Radioisotopes in Research," which is planned to meet the needs of various types of users. Information can be obtained by writing the Institute, P. O. Box 117, Oak Ridge, Tenn. Actual practice in the use of radioisotopes as well as advice on the setting up of laboratory facilities is obtained in these courses. The school is located in an unrestricted part of Oak Ridge and no special clearance is required. However, attendance is limited to citizens of the United States. Other training centers are located at various schools and universities throughout the country.

The fabrication and experimental section of the Hanford Works.

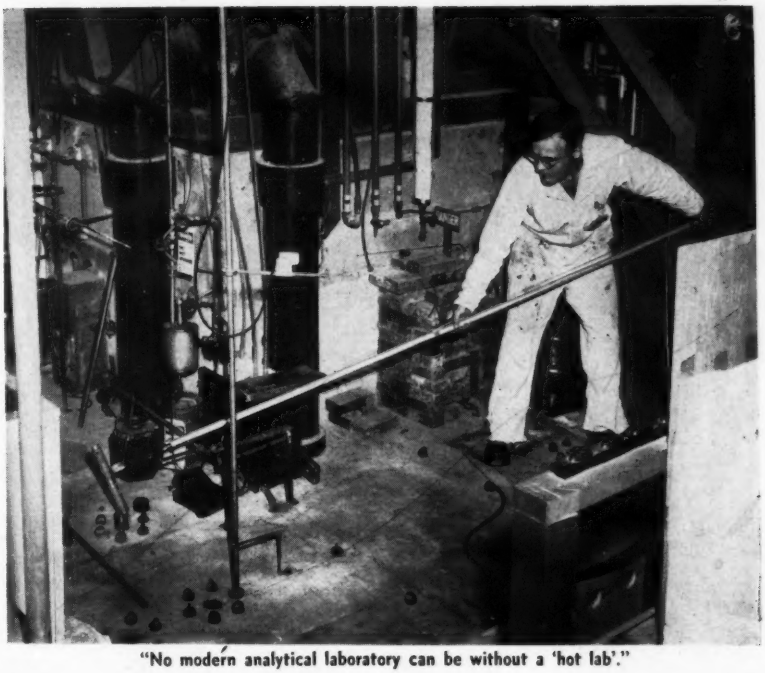
unlabelled compound is determined. From this ratio the analysis of the original material can be computed. Thus it is not necessary to separate *all* of the constituent from the original mixture and separation methods such as recrystallizations and partial distillation become practicable as analytical techniques.

Interestingly enough, radio-chemistry is remarkably simple when compared with ordinary chemistry. In contrast to the hundreds of thousands of different chemical compounds, there are only about 700 known isotopes, some stable but most radioactive. Furthermore, the spontaneous reactions of these isotopes are reproducible and relatively simple.

According to the modern view, the nucleus of an atom is made up of closely packed particles, protons and neutrons. Atoms containing the same number of protons but differing in the number of neutrons are called isotopes and are practically identical in chemical behavior although their nuclear behavior may be quite different. From the standpoint of ordinary chemistry, then, the number of protons in the nucleus determines the character of the element, whereas in the field of nuclear chemistry, the number of neutrons is equally important. Various reactions are possible between atomic nuclei and different types of radiation. The reactions which make radioisotopes so useful are the so-called spontaneous reactions in which one isotope is converted to another accompanied by emission of radiation or particles. A very important feature of any of these spontaneous reactions is that it may be completely characterized by specifying the type of radiation, its energy or penetrating power and its half-life.*

The accompanying table lists some of the radioisotopes which are available through the Commission† at nominal cost together with some of their more important properties.

With the help of the table and supplementary information from the literature on the penetrating power of the radiation, a tentative choice of a particular radioisotope for a job can be made. For example, carbon-14 which has six protons in the nucleus and eight neutrons, making a total of fourteen nuclear particles, emits negative beta rays (electrons) and has a half-life of 5100 years. As a result of this reaction, the carbon is converted to ordinary nitrogen which is stable. The intensity of radiation from a given size sample, that is, the number of particles or quanta being emitted per unit time, is inversely proportional to the half-life. Therefore, carbon-14 with a half-life of 5100 years is a relatively weak emitter, and would be considered where such a material is desired.



"No modern analytical laboratory can be without a 'hot lab'."

A few actual applications are described below, the particular examples being chosen because of their practical nature and because they illustrate different ways in which the special properties of radioisotopes may be utilized. Their use in quantitative analysis has already been mentioned.

1. Tungsten 185 added to the melt of a high temperature alloy forms a convenient radiation source for an autoradiograph of the metal used to detect flaws.

2. Cobalt 60 and Strontiums 89 and 90, beta emitters, are being studied for use in removing static charge from textiles by ionization of the surrounding atmosphere. Instruments for measuring this static charge using radioisotopes to provide an ionized atmosphere have already been worked on.

3. Carbon 14, a beta emitter, is being studied for application in an instrument to measure continuously the thickness of a very thin film. The radiation source, Carbon 14, is placed on one side of the film and a counter on the other side picks up the radiation which penetrates the film. With this device it is possible to make a continuous thickness record without touching the film.

4. Phosphorus 32, when added to steel makes possible an analysis for phosphorus by auto-radiograph technique.

These examples show a few ways in which radioisotopes are already in service However, the field is wide open for new ideas, and engineers with special problems are in a good position to invent new applications.

SUMMARY

Atomic energy is making itself felt in industry in several ways. The enormous construction program enables certain cooperating companies to build up their technical staffs and become educated in the type of construction peculiar to nuclear energy plants. The resulting demand for special products and techniques affects a large number of suppliers and industrial development laboratories. Finally, the increasing availability of radioisotopes creates opportunities which can only be guessed at. Of course, the use of radioisotopes to simplify chemical analyses is already well established and no modern analytical laboratory can afford to be without a "hot laboratory".

Active development in the field of atomic energy can be expected to continue indefinitely. An unsettled international situation will demand a strong military development, while more settled conditions will permit industrial exploitation for useful power. The latter appears to be an economic possibility. Promise of a continued and increasing supply of radioisotopes should encourage industry to take full advantage of their possibilities in research, development, and industrial operations.

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2. Talk before American Mining Congress at San Francisco on Sept. 23, 1948.
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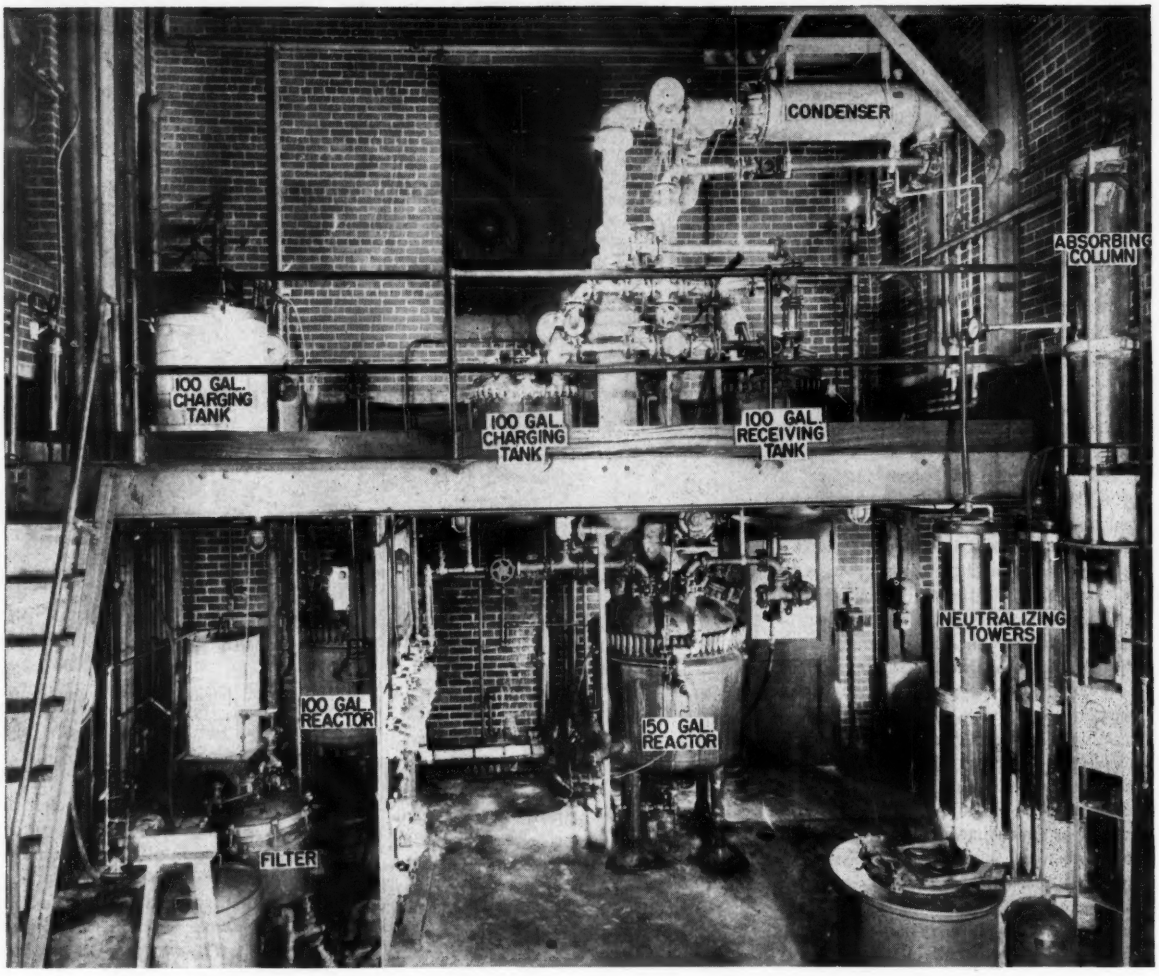
4. *"Thermal Neutron Cross Sections for Elements and Isotopes H-Bi"* A.E.C.D.—2138.

* Readers not already acquainted with the term "half-life" should become so, as it will occur frequently in atomic conversations. The half-life of a radioactive material is defined as the time for one half of a given sample to disintegrate. In the next equal interval of time half of the remaining sample will disintegrate and so on.

† Isotopes Branch, U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn.



Pilot plant used in the process development of DMC—di-(p-chlorophenyl) methyl carbinol.

Process Development of DMC, A New Miticide

by R. L. SAVAGE*, R. Q. WILSON, and J. E. YOCOM
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THE ACTIVE INGREDIENT in the new miticide, Dimite, will involve large-scale operation of Friedel-Crafts and Grignard reactions.

IN RECENT years fruit growers have become much more conscious of the destructive pests commonly referred to as the red spider or red mite. They are not insects, but belong to the spider class (Arachnida). There are two distinct types of these pests, the European red mite, and the common red spider. The European red mite overwinters as red eggs which are usually laid on the bark of trees and which may be destroyed with a dormant oil spray. The second type overwinters as partially grown spiders under flakes of bark and in grass and debris on the ground. A dormant oil spray has relatively little effect on this type.

Under favorable conditions, it takes only 10 to 12 days for a generation, and since the female lays up to 100 eggs, it may be but a short time until these pests have attained damaging numbers.

This problem has increased in seriousness with the widespread use of DDT. DDT does not destroy these pests, but does kill the predators that normally live on red spiders, thus giving the spiders a free chance to develop a large population.

Because of the increased importance of this problem, the Sherwin-Williams Company's Agricultural Chemical Division has developed a pesticide, Dimite, which effectively controls these pests. The laboratory investigations were carried out

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at Western Reserve University[1] and the Ohio State University, and the pilot-plant development has recently been concluded in the chemical engineering laboratory at Battelle Memorial Institute.

DIMITE

The active ingredient in Dimite is di-(*p*-chlorophenyl) methyl carbinol (DMC), a solid, melting at 69-69.5° C. Dimite is formulated to contain 2 pounds of DMC per gallon. A spray for field use is prepared by mixing 1 pint of Dimite with 100 gallons of water.

Dimite is a contact pesticide. It kills both adults and nymphs, and the residual effectiveness will continue for several weeks. It is specific in its action. It kills only mites, red spiders, and related forms. It is not hazardous to the user and has been proved safe at the recommended rate of application on foliage of apples, pears, citrus, and other fruit trees as well as greenhouse plants.

THE REACTIONS

The reactions involved in the preparation of di-(*p*-chlorophenyl) methyl carbinol include a Friedel-Crafts synthesis of an intermediate compound, *p, p'*-dichlorobenzophenone and a Grignard reaction to form the final product.

Chlorobenzene and carbon tetrachloride are condensed in the presence of anhydrous aluminum chloride to give di-(*p*-chlorophenyl) dichloromethane and the corresponding isomers:

$$2ClC_6H_5 + CCl_4 \longrightarrow (p\text{-}ClC_6H_4)_2\ CCl_2 + 2HCl$$

This substituted methane is hydrolyzed by 95 per cent alcohol to *p, p'*-dichlorobenzophenone:

$$(p\text{-}ClC_6H_4)_2\ CCl_2 + H_2O \longrightarrow (p\text{-}ClC_6H_4)_2CO + 2HCl$$

p, p'-Dichlorobenzophenone and methyl magnesium bromide[2] are reacted in the presence of butyl ether to give a magnesium addition compound:

$$(p\text{-}ClC_6H_4)_2CO + CH_3MgBr \longrightarrow (p\text{-}ClC_6H_4)_2CCH_3(O\text{-}MgBr)$$

This Grignard complex is hydrolyzed with aqueous ammonium chloride solution to give di-(p-chlorophenyl) methyl carbinol:

$$(p\text{-}ClC_6H_4)_2CCH_3(O\text{-}MgBr) + H_2O \longrightarrow (p\text{-}ClC_6H_4)C(OH)CH_3 + Mg(OH)Br$$

PROCESS

The Friedel-Crafts reaction was carried out by adding a mixture of chlorobenzene and carbon tetrachloride to a 150-gallon glass-lined reactor containing carbon tetrachloride and anhydrous aluminum chloride. The reaction is exothermic and the rate of addition of the chlorobenzene-carbon tetrachloride mixture was determined by the rate at which heat could be transferred from the reactor in order to carry out the reaction in the 20-25° C. temperature range to obtain a maximum yield of the *p,p'* isomer. The addition period varied from 3 to 5 hours depending upon the jacket-cooling water temperature. After addition was complete, the reaction mixture was stirred for 3 hours in a temperature range of 25-30° C. The hydrogen chloride gas liberated from this reaction was absorbed in a packed tile tower and the acid formed was neutralized by passing it through two neutralizing towers filled with limestone. The conveying pipes were of Saran.

The aluminum chloride addition compound was hydrolyzed to the substituted methane by the addition of 20 per cent sulfuric acid during a period of 2-4 hours. The hydrogen chloride gas that was not absorbed in the reaction mixture was absorbed in the absorption tower and neutralized.

The excess carbon tetrachloride and unreacted chlorobenzene were removed by steam distillation, leaving a viscous oily residue containing di-(p-chlorophenyl) di-chloromethane and its isomers. These substituted methanes were hydrolyzed to the ketone by refluxing for 90 minutes with 95 per cent isopropyl alcohol. The hot slurry was pumped to a 100-gallon stainless steel reactor where it was cooled with brine to 0-5° C. and the *p,p'*-dichlorobenzophenone crystals and the *o,o*, and *o,p* isomers not dissolved in the alcohol formed a semi-solid mass on the bottom of the reactor. The isopropyl alcohol containing some of the *o,o* and *o,p* isomers was pumped off and the residue in the reactor was reslurried with naphtha. The naphtha slurry was filtered in a stainless steel horizontal plate filter, then washed with fresh naphtha, and with 5 per cent aqueous isopropyl alcohol which removed the remaining isomers. The solid *p,p'*-dichlorobenzophenone obtained represented 35-40 per cent of the theoretical yield.

The intermediate compound was removed from the filter press, weighed and, after an aliquot was taken and dried, charged to the 150-gallon glass-lined reactor together with toluene, water, and soda ash. The mixture was heated to boiling with agitation. The *p,p'*-dichlorobenzophenone dissolved in the toluene, and the aqueous sodium carbonate solution neutralized any acid present. The lower aqueous layer was pumped off and the toluene solution dried by refluxing and removing the water by azeotropic distillation. After the toluene solution was dried, it was pumped to a 100-gallon stainless steel charging tank and methyl magnesium bromide in butyl ether was pumped into the dry reactor. The toluene solution was kept warm and added to the Grignard reagent over a period of from 70-90 minutes. After the addition period, the mixture was refluxed for 1 hour to complete the reaction.

The reaction mixture was cooled to 40° C. and the Grignard complex hydrolyzed by adding an aqueous ammonium chloride solution. After a brief period of agitation the aqueous layer was pumped off and the oily layer containing the di-(p-chlorophenyl) methyl carbinol and solvents was given a 2 per cent aqueous sodium carbonate wash.

The toluene and butyl ether were removed by steam distillation. The molten product remained in the kettle and was drained from the reactor and allowed to solidify. The yield of di-(p-chlorophenyl) methyl carbinol ranged from 85-90 per cent of the theoretical.

Because di-(p-chlorophenyl) methyl carbinol is easily dehydrated, the actual carbinol content of the product was never 100 per cent but varied from 85-97 per cent in most runs.

DESCRIPTION OF THE PILOT PLANT

The accompanying illustration shows the pilot plant. Most of the reactions and operations were carried out in a 150-gallon glass-lined reactor which was jacketed for heating and cooling purposes. Agitation was provided by an anchor-type glass enameled agitator. Glass-lined auxiliary equipment used with this reactor consisted of a 100-gallon receiver, a 100-gallon charging tank, a packed column with by-pass, and a condenser. All pipe lines connected with this unit were glass lined.

In order to provide increased flexibility in the equipment, an additional 100-gallon stainless steel charging tank was installed for this project. It provided for gravity feed through a rotometer to the reactor.

To enable the equipment to withstand the numerous adverse effects of hydrochloric and sulfuric acids, hydrogen chloride gas, and hot toluene and carbon tetrachloride vapors it was necessary to employ special materials of construction. The neoprene gaskets used between the flanges of the glass-lined equipment had to be replaced with Teflon gaskets. It was also necessary to face the neoprene diaphragms in the diaphragm-type valves with Teflon sheeting.

FUTURE DEVELOPMENT

Because of the present raw materials situation, the first plant process will probably utilize chlorobenzene and carbon tetrachloride as the starting materials. However, the formation of excessive amounts of inactive isomeric compounds makes the use of other starting materials economically attractive because the *p,p'*-compound is the principal product. Investigation of the alternative processes has been done on a laboratory scale.

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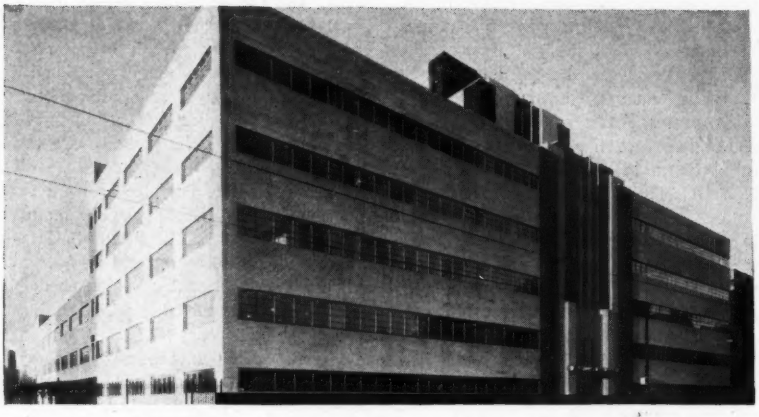


Smith, Kline & French's new $7-million building is a few blocks from Philadelphia's center.

Integrated Facilities Mark New PHARMACEUTICAL PLANT

SMITH, KLINE & FRENCH LABORATORIES' new $7-million building brings all research and manufacturing operations into larger, completely modern quarters.

RISING appropriately on the original site of an 18th century hospital, Smith Kline & French's new plant in Philadelphia, Pa., brings together under one roof the previously scattered activities of the 108-year-old pharmaceutical manufacturing firm.

Starting out in 1841 as George K. Smith's apothecary shop, the firm shortly thereafter discontinued retail business, became a drug wholesaler. The firm name changed under various partnerships, and by 1891, when it became Smith, Kline & French Co., it had already established its own laboratories with the end in view of entering the manufacturing field. In 1929 the manufacturing and wholesaling functions were split into two separate organizations, giving rise to the present Smith, Kline & French Laboratories.

WAR DELAYS CONSOLIDATION

Growth of the firm's activities resulted in its operations being spread throughout the city of Philadelphia in seven different locations. The decision to consolidate all activities (except those of the domestic wholesaling subsidiary) was made shortly before the war, but construction was delayed until the middle of 1946. Two years later the new building was ready for partial occupancy, but only this month was completion signalized by a formal opening. The completed facilities include research, manufacturing and executive offices of the parent firm; offices of two export subsidiaries; and the Eastern offices of Avoset Co., a West-Coast manufacturing subsidiary.

Occupying almost two acres of a four-acre site, the building is five stories high, topped by a penthouse containing service installations. All windows are double-paned insulating glass, and the ceilings are covered with sound-absorbent material. All principal working areas are air-conditioned, not only for the comfort of the 825 employees, but also for the maintenance of dust-free conditions essential to pharmaceutical manufacturing.

PROGRESS DOWNWARDS

The progress of a product—from conception of the idea to the cartoning of bottles ready for use—is from the top floor downwards.

On the top floor are the research laboratories, where new compounds are synthesized. Also on this floor are laboratories for pharmacology, biochemistry, and analytical research, thus providing opportunity to test the effect of new compounds on animals and to develop assaying procedures.

Pharmaceutical chemistry, bacteriology and physical chemistry laboratories are on the fourth floor. The first-named department synthesizes larger quantities of promising pharmaceuticals for cooperative testing in conjunction with hospitals and other clinical laboratories. Also on this floor are a laboratory supply room, the library, medical and literature departments, and research administration offices.

The laboratory rooms, fairly large in size are divided by partitions into multiple smaller units. Walls on three sides afford considerable privacy, but the open end, opposite the windows, makes possible common use of specialized equipment. A larger-than-usual proportion of bench working area is enclosed in individual exhaust hoods. Fire- and explosion-proof hydrogenation rooms are equipped with exterior controls; and seven rooms with separate air-conditioning systems are located in various laboratories where techniques require close control of temperature and humidity.

A unique feature of the pharmacology laboratory is the small-animal cage washer. Believed to be the first of its kind ever built, it is comprised of a large metal housing into which the cages are rolled through a double front door. Once the cages are in and the door is locked, a complete automatic cycle ensues whereby the cage is washed with a detergent, rinsed off with sprays of hot water, and then steam-sterilized.

Of particular interest to analytical chemists is the constant- temperature balance room. In order to insulate the room

Organic research laboratories provide both privacy and common access to equipment.

from all outside disturbances, walls and windows are of double thickness; and the mounting for the semi-micro and micro balances rests on a 2½-ton concrete block set in rubber.

MANUFACTURING

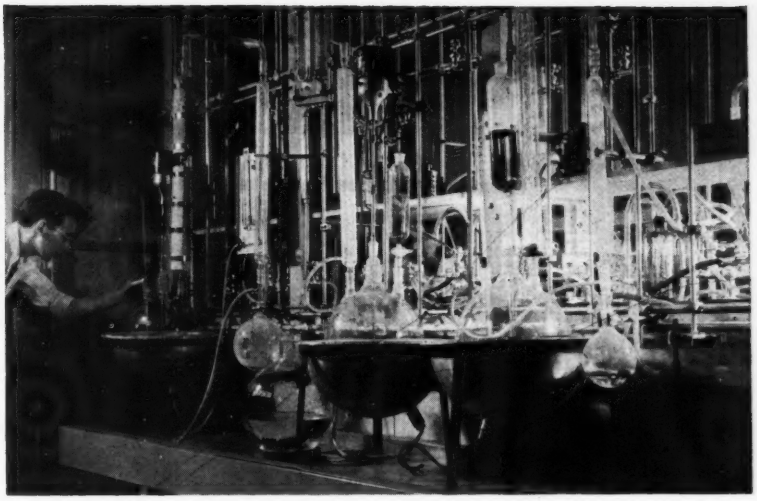
Large-scale manufacturing of the firm's pharmaceutical specialties is carried out on the third floor. A feature of the mix tank is the control panel, on which the switch for each pump is locked, and a single key (of which there is no copy) operates all the locks. The key cannot be removed when the lock is open, and thus it is impossible to pump two liquids into the tank simultaneously.

Also on the third floor are analytical control laboratories, which certify the quality of raw materials, intermediates and finished products. Included in this department is a plant research laboratory. The research laboratories are interested only in making relatively small quantities of a compound—regardless of cost. Plant research men study fundamental research results and the existing literature, cast about for the most expedient process, the cheapest raw materials, the greatest yield. There is no pilot plant as such. That step is carried out in the chemical manufacturing section in conjunction with plant research.

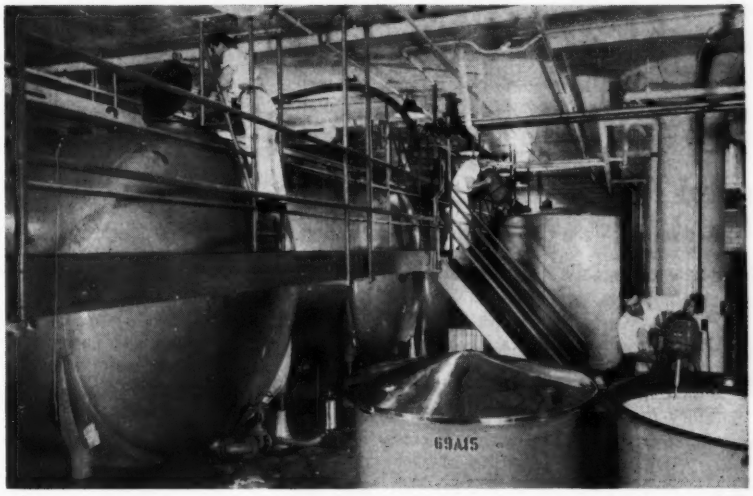
Finished products flow by gravity from the third floor to the second, where they are bottled, capped, and labeled. They then go, again by gravity, to the first floor for shipping and storage. Many of the automatic machines used in these sections were developed and produced by the firm's own mechanical development department. Electronic tablet-counting machines are an important feature of the packaging section.

Raw materials are stored in the basement as well as on the third floor. Chemical development and manufacturing (as distinguished from specialties formulation, on the third floor) are on the first floor. The former department makes small batches of promising chemicals for large-scale clinical testing. Offices occupy a portion of the third floor. A rather unusual first-floor feature is a print shop that turns out all of the company's promotional and advertising literature.

The new building, the equipment, and the room remaining for expansion reflect management's optimism for the second century of the company's operation. "These new facilities," says Board Chairman C. Mahlon Kline, "will give every member of our organization the finest working quarters that can be provided today. The management has spared no cost or effort to supply the best equipment and the most pleasant occupational environment. Everyone—scientists, production people, administrative personnel and executives—will gain incentive from these surroundings."



Fractional distillation apparatus in chemical development laboratories, where relatively small batches of promising chemicals are manufactured for large-scale clinical testing.



Liquid manufacturing section, where formulations are mixed and stored in glass-lined tanks (background) whence they flow by gravity to floor below for bottling and labeling.

General view of chemical manufacturing. Direct electric heat or electrically heated oil supplies controlled heat for carrying out chemical reactions. Still on right is of solid silver.

How Market Research Can Aid in SCREENING NEW CHEMICAL PRODUCTS

by GEORGE E. NADLER*

BEFORE SPENDING LARGE SUMS OF MONEY for a detailed analysis, market research can develop, through screening, a reasonably accurate idea of a new chemical's commercial potential.

SINCE the costs of research and development follow a rapidly rising curve as a new product advances from the laboratory to the plant, it is highly important to reevaluate research projects at every stage of their progress. Market research should both precede and parallel technical research. In the screening operations that characterize the initial steps of well-managed development, it will spotlight the relative merits of individual projects, help a company eliminate its commercially-unsound programs before they make a major dent in the research budget.

Although market research is a relatively new and small operation in many large companies, top management is becoming increasingly aware of its importance and value. Because of their organizational structure, however, most chemical firms still emphasize the laboratory phase of research and development, channeling a major slice of the research dollar into technical work. As a result, new chemical products stream from the laboratory to a small marketing organization that often finds itself woefully short of personnel to do a thorough market research job.

Since it may require as much time to develop the market for a new chemical product as it does to develop the product itself, this situation adds up to an extremely complex problem for research management. Efficient market "screening" can solve a large part of that problem. Experience has shown that it will help the market research organization save time and effort in determining the commercial potential of a new chemical product.

"Screening" may be defined as a preliminary evaluation of a new product's applications, market potentials, selling price, and competitive status, together with an analysis of the raw materials situation and of the costs and margins upon which the product's success will largely depend. The screening process, however, also helps spotlight new fields of interest toward which the laboratory might profitably direct its effort, and it may reveal the commercial weaknesses of products during early stages of development, thereby terminating unnecessary expenditures at the earliest possible time. Usually, however, screening is used as a relatively fast and inexpensive method of determining the inherent commercial possibilities of a product *already developed* by the laboratories.

Screening is an especially helpful tool for small market research organizations who are faced with the task of examining a large number of new chemicals. Like a thresher that separates wheat from the chaff, it will indicate the most promising products from an array of new developments. It is just as important that the market researcher know at an early stage of his investigations that a product may not have the necessary elements for successful commercial development as it is for him to be aware that a product does possess all of the prerequisites.

Screening, of course, will not develop as penetrating or as detailed an analysis of the commercial possibilities of a new chemical as would an extensive market survey. But screening should provide information that will justify or eliminate the need for a more thorough and costly market study.

REQUISITES OF SCREENING

The principles of screening should be applied by the researcher after the laboratory has turned over available data on a new or improved product. The laboratory should be able to list the basic physical and chemical properties of the product. Some preliminary application work, spotlighting logical industrial uses for the new chemical, will also be helpful.

However, detailed product application study within a company developing a new item is not always possible or justifiable in the initial stages of investigation; therefore, the marketing man visualizing

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the properties of the product must be able to draw from his general background knowledge of the chemical-consuming industries and make an effort to determine the most likely niches for the new chemical. A general familiarity with the troublesome, unsolved problems of industry is an invaluable asset. If, for example, the properties of a product suggest that it will prevent chocolate from blooming and softening, the researcher knows that the baking and confectionery industries should be interested in examining the new material, for they have never been able to eliminate these difficulties entirely in their use of chocolate.

MECHANISM OF SCREENING

Concept of Product and its Applications: To illustrate the screening mechanism, let us take a hypothetical new product and discuss, by using market data and techniques, how the basic points of such a study are pointed up and appraised. We shall assume that the product in question is a new and improved plasticizer designed for use in vinyl resins; we will name it "Plastolex."

As the first step in screening "Plastolex," the marketing man must gain a clear conception of the properties of the new product and understand all of its supposedly unique and unusual qualities. For this information he logically turns to the laboratory men who have developed the product. The creators of "Plastolex" believe that it should have excellent plasticizing action when used with vinyl resin compounds, since it showed little tendency to "sweat" or migrate to the surface of a vinyl film for which it was developed. It also imparted excellent properties of elongation and elasticity. Further, it was non-toxic, alkali-resistant, and had no objectionable odor or color. Finally, "Plastolex" did not appear to be volatile and it possessed good heat and color stability. In brief, it exhibited the properties desired in an ideal plasticizer.

To supplement his knowledge of plasticizers, the market researcher consults technical articles and industrial texts and finds that plasticizers may be used in plastic compositions for many reasons: The highly flexible vinyl compositions, such as sheeting and film, contain softening agents which are responsible for the finished product's high degree of flexibility. Vinyl wire insulation may contain flame resistant plasticizers; other modifiers used in wire insulation may actually give superior insulating characteristics. Still other plasticizers may, for example, impart oil or grease resistance.

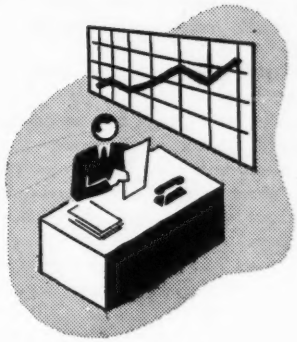
The researcher learns that vinyl resin forms such as sheeting and film, flexible extruded types, textile and paper coatings, and most adhesives require a plasticizer for one or more of these reasons. Typical consumer products made from these plasticized compounds are garden hose, upholstery, wearing apparel, luggage covering, shower curtains, wire coatings, and book bindings. Often these compounded products contain 33% of plasticizer plus a similar amount of filler. Many of them, however, require no filler; therefore, their plasticizer content may be estimated as 50% of the weight of the pure resin.

Magnitude of the Market: With this information as a basis, the researcher determines the maximum sales potentials for "Plastolex." For necessary statistical data he draws upon selected articles in chemical and allied trade journals and catalogs; the Department of Commerce, Bureau of Census "Facts for Industry, M-19H Series"; "Industry Report–Chemicals and Drugs," prepared by the Chemical and Drug Section; and the Tariff Commission's annual report "Synthetic Organic Chemicals—U. S. Production and Sales."

In developing information on the sales or "shipment and consumption" of vinyl resins, the researcher must not only be careful in selecting his statistics, but he must also fully understand the data. For example, the total "shipment and consumption" figures of vinyl resins issued by the Bureau of Census are not entirely based on the pure resin content; rather the data on sheeting and film is for compounded materials which contain plasticizer and possibly filler. The Tariff Commission statistics, however, report sales on a 100% resin content for all forms or classes of vinyls. In pointing up vinyl resin sales as a barometer for plasticizer sales requirements, the Tariff Commission figures may be used as such, whereas the Bureau of Census figures require interpretation.

STEPS IN SCREENING A NEW CHEMICAL

1. Get a clear conception of properties and unique and unusual qualities.
2. Estimate maximum sales potential.
3. Determine trends taking place in the market and what effect they are likely to have.
4. Estimate probable sales.
5. Look into the competitive situation; find out strengths and weaknesses of competing products.
6. Investigate availability of raw materials.
7. Be sure patent situation is clear.
8. Get rough idea of processing costs and profit margin.



The Tariff Commission figures, the researcher finds, report sales of vinyl resins (100% vinyl content) as 160,948,000 pounds in 1947. If, however, only about 70% of vinyl resins are used with plasticizer (most molded and cast forms do not require a modifying agent), vinyl plasticizer requirements in 1947 are calculated to be in the neighborhood of 56,250,000 pounds, based on one part of plasticizer necessary for every two parts of resin.

Trends of the Market: It soon becomes apparent to the researcher that the vinyl resin industry is undergoing considerable development and expansion. However, he must consider some of the newer resins now in development which contain plasticizer within their molecular configuration, since they will require no added conditioning agent and could affect vinyl plasticizer sales in the long run if they became widely used.

On the other hand, several of the major resin producers are enlarging their production capacities, new resin producers are entering the field, and companies in the film and sheeting business themselves expect to expand their operations. All of these factors tend to indicate that the demand and market for suitable plasticizers is growing.

In determining the volume of vinyl resin sales as an indicator of plasticizer requirements, the researcher also studies rate-of-growth factors and estimated future sales trends. He may find it helpful to prepare several charts. On one he can show that the rate of growth of vinyl resins and plasticizer requirements far outdistanced the other resins and plasticizers. For example, in 1946, vinyl resin sales amounted to 147,713,000

pounds, with an estimated requirement of some 51,700,000 pounds of plasticizers, as compared to 1939, when approximately 1,200,000 pounds of resin were consumed, with a plasticizer requirement of approximately 450,000 pounds. Projecting these figures against those of other resins and plasticizers for the same period should indicate the meteoric rise and rate of growth of vinyl plasticizers in industry.

The researcher may also prepare a second chart on which he plots vinyl resin sales for a given period of time, the calculated amount of plasticizer necessary to condition that quantity of resin (only about 70% of vinyl resins use plasticizer), and the sales of the principal plasticizers used with vinyl. The area on the chart lying between the curve for the *calculated* plasticizer requirement and the curve for reported sales of plasticizers to the vinyl industry may be indicative of the unsatiated demand for suitable plasticizing agents.

Both of these graphic presentations will show that the market in which "Plastolex" is to compete is not only large and expanding rapidly, but that there is an unsatisfied demand.

For up-to-date information on the status of plasticizers in the vinyl resin field, however, the researcher finds published information inadequate, and, therefore, must contact the vinyl resin industry directly. The results of selected interviews with various types of consumers of vinyl plasticizers reveal that the ideal plasticizer has not as yet been made available to industry and further verifies that there is a shortage of adequate plasticizing agent. In fact, the researcher learns that the shortage of satisfactory plasticizer has limited vinyl resin production in recent years. These points, of course, are further indications that there is a waiting and sizable market for "Plastolex" if it will perform satisfactorily under commercial operating conditions.

The researcher, however, realizes that the vinyl resin market is in part a captive market. One of the principal consumers of plasticizer is the vinyl resin producer who fabricates and sells bulk sheeting and film. There are several large vinyl resin producers who also produce and use their own plasticizer. "Plastolex" must indeed be unusual if the market researcher can assume that his product will be preferred by those companies over products which they produce themselves.

Selling Price: Although we have discussed the magnitude and market trends for "Plastolex" first in this paper, the researcher recognizes the fact that the cost of producing and the ultimate selling price are both basic factors requiring his early consideration: They are principal obstacles that any new product must hurdle in a normal competitive buyers market. It is, of course, much more difficult and expensive to introduce and sell a new product with plus properties at a premium price than it is to promote a less unique product at a competitive price level. The pricing of a new product is a detailed study in itself and this paper does not propose to do any more than touch upon a few highlights. The initial product screening will indicate whether the estimated selling price of "Plastolex" will fall within 45¢ to 55¢ per pound—the price range of the principal vinyl resin plasticizers, those with which "Plastolex" must compete if it is to get its fair share of the large vinyl resin plasticizer market.

Laboratory workers may forsee possible increased margins that may be obtainable over competitive materials, based on their knowledge of the plus properties of their product, whether it be a "Plastolex" or some other chemical. This critical point can be more fully developed and proved through field sampling if the product reaches advanced stages of commercial evaluation.

Generally, no one individual or group within a large company independently sets or estimates the price of a new product. Pricing is a joint operation. Market research may be considered here as a liaison between chemical research, engineering research, production and—in the advanced stages of investigation—sales and management. Because the market research organization has an intimate knowledge of the product at this stage of development, however, its recommendations usually carry considerable weight in establishing final pricing policy.

Competition: Competition, a vital phase of any new product discussion, is then considered by the researcher from both a product and a supplier point of view. A study of product advertisements and news releases on new product developments in the chemical and allied trade journals serves as a good starting point in developing a list of commercially available vinyl plasticizers. Industrial advertisements and product and trade name indexes reveal the names of the twelve leading manufacturers, and, as mentioned before, personal contact in the resin field helps develop this phase of the investigation even more fully.

Although there are literally thousands of chemicals that have been examined for their ability to plasticize vinyl resins, the researcher finds that there are only some two dozen commercially available and widely used products. Although these materials may be classified in numerous ways, the investigator divides them, for simplicity's sake, into three broad groups: The organic ester types, such as dioctyl phthalate and dioctyl sebacate, because they afford maximum clarity and flexibility, find general use in shower curtains, ladies' handbags, and similar items. The inorganic ester types, exemplified by tricresyl phosphate and dibutoxy ethyl phosphate, find industrial uses in wire and cable coverings although their toxicity, objectionable odor, and low temperature resistance have restricted their wider use. The polymeric types, such as polyesters and acrylonitrile-butadiene copolymers, find use in artificial leather and upholstering material because of their low volatility and non-migrating characteristics.

A study of the specific products which comprise this classification of plasticizers indicates that DOP (dioctylphthalate) is among the most widely used products. Dioctyl sebacate, also a member of the organic ester class, finds general use, but not to the extent of DOP. Undoubtedly, one of its limiting factors is its high cost. There are several products which, because of their guaranteed nontoxicity, find use in the medicinal field despite their relatively high prices. As mentioned earlier, the investigation showed that consumers of vinyl plasticizers report that they have not as yet been able to obtain a completely satisfactory product. DOP's popularity is due in part to the fact that it is the best compromise on all of the desirable properties obtainable from available products. Thus, the competitive product situation appears to be favorable for "Plastolex". It is possible that this new plasticizer will perform commercially where other products have failed. However, one thing is assured: The vinyl resin industry, since it is on the look-out for more satisfactory materials, will be keenly interested in examining and evaluating "Plastolex".

Raw Material Situation: Because a supply-demand-price problem exists here, an analysis of raw materials also falls within the scope of the market research screening operation. However, since "Plastolex" is an imaginary product, it is difficult to anticipate or foresee all of the possible raw material factors that must be studied by a researcher in an analysis of this product's raw material situation. Nevertheless, there are a few general points that should be considered in this phase of any new product evaluation. It is, of course, imperative that all the necessary raw materials be available in commercial quantities. This is particularly emphasized as there are numerous commercial chemicals today that are on the critical supply list; and many producers have their production oversold and may not be able to service new customers.

Although not always possible, it is desirable that the critical materials be available from more than one source of supply. It is conceivable that at some future date a firm may no longer find

(*Turn to page 513*)

A CI REPORT ON

AGITATORS FOR LIQUIDS:

Modern Processing Requires Effective Equipment

by JULIAN C. SMITH
Cornell University
Ithaca, N. Y.

PRACTICALLY ALL BRANCHES OF THE PROCESS INDUSTRIES invest in liquid mixing equipment. In many cases the proper choice of mixers determines the success or failure of the project. New developments and proper selection of existing agitator types has been of particular importance in forwarding the current trend from batch to continuous processing. The author delineates the types of equipment available for mixing liquids in vessels and presents a consensus of manufacturers and users on agitator performance and selection.

ALMOST all industrial processes depend to some extent on the mixing of material—in reactions, purifications, or other processing steps, or to blend batches into a uniform homogeneous product. Yet it is only in the past few years that mixing has begun to receive a scientific basis through fundamental studies of agitation and agitator characteristics. The results have led to better products and considerable savings in power in a number of industries, and in some cases to such striking advances that the whole method of processing has been changed. When two phases are brought into contact the rates of reaction and mass transfer depend to a considerable extent on the effectiveness of the agitation; consequently by using the proper agitator, the time required for many process steps has often been shortened from hours or days to minutes or even seconds. The current trend from batch to continuous processing has largely come about through the rational design and application of mixing devices.

Recently many articles have appeared on various aspects of mixer technology: the flow patterns created by various impellers, the design of fitting for mixing vessels, the prediction of power input, and so forth. Yet even the more common agitators are not well known, and many special types have been described nowhere except in manufacturer's bulletins. This report covers the more common agitators used for mixing liquids in vessels, and several of the special types.

The articles published to date contain a number of contradictory statements. Various manufacturers and users do not always agree as to the best type of agitator for a given service. One producer,[15*] for example, does not build mixers of standardized design, preferring to build a mixer for each job.

One difficulty has been that there is no satisfactory criterion of mixer performance. The power input per unit volume of liquid sometimes affords at least a rough index of mixer effectiveness, but the best mixer is now generally considered to be the one that accomplishes a given job with the least amount of power. The statements made in this report regarding performance and application of agitators represent as far as possible the consensus of a number of makers and users of mixing equipment.

The agitation and mixing of liquids can be done inside or outside process vessels, using flow mixers or mechanical agitators. Flow mixers include jets, air lifts, orifice mixers, and so forth, which may be used inside or outside vessels; liquids are also mixed externally in centrifugal pumps and colloid mills. This report is limited to mechanical agitators operating inside vessels.

Such devices are used for every conceivable kind of mixing involving a liquid phase: blending of miscible liquids; emulsification of immiscible liquids; the suspension, disintegration, and dissolving of solids; the dispersion of gases in liquids; and so on. Occasionally three or more separate phases are present; in liquid-phase hydrogenations, for example, good contact must be obtained between a gas, a liquid, and a finely-divided solid catalyst. The agitated liquids range from very thin to exceedingly viscous; even thick pastes can be agitated effectively by some of the mixers described. When tough rubbery or taffy-like masses must be shredded or kneaded, however, other devices are usually used.

* Numbers refer to manufacturers listed at the end of the review, and indicate that the type of mixer is normally supplied by that company. All types made by some manufacturers are not so marked, for some equipment makers will supply any desired agitator on special order; but the usual types and all specialized agitators supplied by each company are numbered.

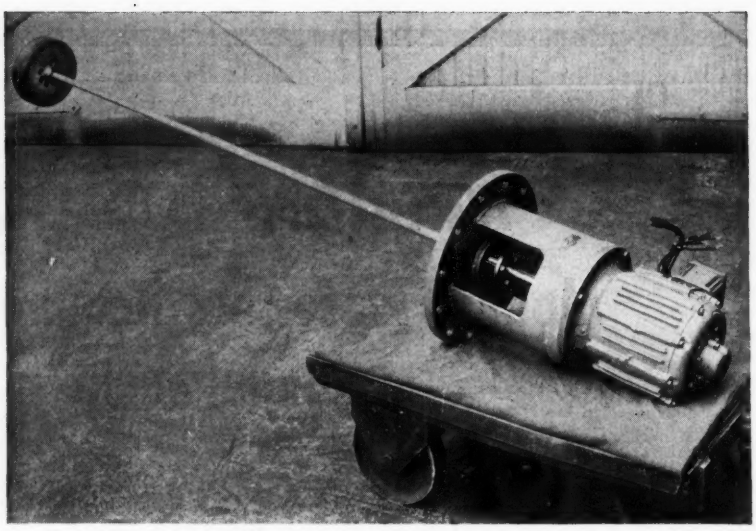
TYPES OF AGITATORS

Except for some special contactors, mixers for liquids may be divided into seven types: propellers, paddles, anchors, turbines, radial propellers, cones, and discs. They can be classified according to the type of flow they produce at the impeller. Propellers, for example, give axial flow parallel to the drive shaft; paddles, anchors, cones, and discs promote tangential flow away from the rotating element; turbines and radial propellers give radial flow perpendicular to the axis of the impeller. The classification is not rigid, for no impeller gives one type of flow exclusively, and some, such as pitched paddles, give two types almost equally. Furthermore, accessories such as stator rings and baffles change the type of flow and greatly affect the pattern of circulation in the vessel.

A discussion of agitators must begin with the tanks and accessories used in conjunction with the various agitators, for they are usually as important to the effectiveness of the unit as the impeller itself. The vessel should be regular in shape and contain no pockets where eddies and dead spots can occur. Cylindrical tanks are better than square or rectangular tanks, and a dished-out bottom is preferable to one that is flat or dished in. For most agitation work vertical cylindrical vessels are used, in which the liquid depth about equals the tank diameter. Higher ratios of depth to diameter may be used, even up to 5 to 1, but two or more impellers on the same shaft then become necessary. The impeller is usually suspended at the end of an overhung top-entering shaft in vessels less than about 12 feet deep, although it is difficult to give a definite value without complete data on the system. In deeper tanks stabilizing devices on the impeller may be used to eliminate shaft whip, and in tanks more than about 16 feet deep an internal steady bearing at the end of the shaft is usually necessary. In very large tanks several side-entering agitators are usually used.

The most important accessories are devices to change the flow pattern inside the vessel, usually by minimizing or eliminating swirl. Impellers that give tangential flow tend to circulate material around the tank in a horizontal plane with no relative motion between the different parts of the liquid. At low speeds or with viscous liquids there is enough drag in an unbaffled vessel to result in fairly strong vertical currents and fairly good mixing; but with higher speeds the swirl predominates, and the tank contents are circulated without being mixed. A deep vortex may form at the surface of the liquid, extending down to and even through the impeller.

To avoid this turbines are sometimes surrounded by a vaned stator ring or operate between vaned stator plates to change the flow from tangential to truly radial and eliminate swirl. More commonly, turbines, paddles, and cones are used in baffled vessels in which four vertical flat baffles project radially inward from the vessel wall. The baffles normally extend for almost the full depth of the liquid. Their width is about one-tenth the diameter of the tank. Sometimes they are set out slightly from the tank wall, and may be at an angle to it when the liquid is fairly viscous. With very viscous liquids baffles are not needed.



Serner's Velofin is a multiple-disc agitator operating at motor speed. The model pictured operates at 1150 r.p.m. in a 1,000 gal. tank for the preparation of caustic solution.

A draft tube is a cylinder set above a propeller or turbine coaxially with the drive shaft. Its function is to contain the input flow to the impeller, and to create a strong vertical current from the surface of the liquid to the agitator. When heat must be transferred to or from an agitated vessel one or more banks of internal coils may be used; sometimes the innermost coil is made to function as a draft tube. Vertical tubes[10, 14] are now being used to some extent in place of helical coils since they result in higher coefficients of heat transfer and act as baffles.

PROPELLERS[3, 5, 7, 10, 11, 14, 18, 19, 20, 23, 26]

Propellers are perhaps the most economical agitators for simple mixing jobs. They may carry two, three, or four blades, but most commonly standard 3-bladed marine propellers are used. They operate at fairly high speeds, from 300 to 1700 r.p.m., with peripheral speeds of 1,000 to 3,000 feet per minute. They move a cylinder of liquid in a straight line, and create a zone of high turbulence near the blades.

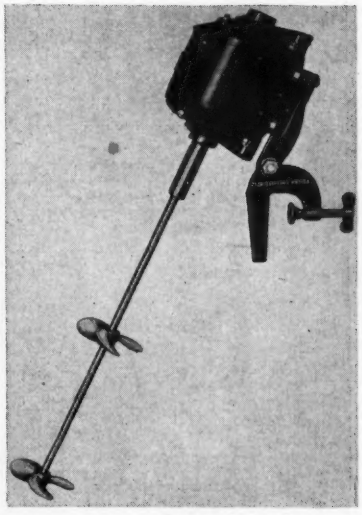
To insure good mixing the shape of the vessel and the location of the propeller must be correct. Tanks with square corners and dished-in bottoms are especially bad. The propeller must be placed off-center either horizontally or vertically, so that the cylindrical stream of liquid is deflected fairly gently upward and sideways by the walls and bottom of the tank, giving top-to-bottom turnover and a small amount of swirl. With improper location the power consumption may be excessive, or there may be deep vortexing and very poor circulation.

For the best mixing the propeller should not be near the bottom of the tank, but should be submerged at least two to four times its own diameter. An overhung shaft 6 feet long can be used in agitating vessels up to 10 feet deep, and longer shafts are not often needed. If they are, they may be stabilized by fins underneath the propeller blades,[18] or by a steady bearing on the tank bottom. To avoid very long shafts, side-entering propellers are used; they have the disadvantage, however, that they require a stuffing-box that seals against the liquid. The stuffing-box on top-entering impellers operates in the vapor space above the liquid, and often is not needed at all.

Permanently-mounted propellers are set vertically or at a slight angle entering from the top of the tank, or horizontally through the side of a large tank. Single units draw up to about 50 HP. With a top-entering propeller the flow is usually directed downward; when two propellers are used on the same shaft they may both direct the flow downward, or the upper one acts downward and the lower one upward.

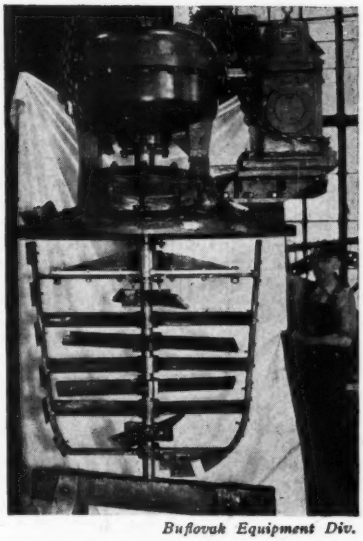
Portable propellers[11, 14, 18, 22, 25] drawing from ⅛ to 5 HP are available for agitating open vessels. Small ones operate at full motor speed; larger units include a speed reducer. They are often supplied with adjustable swivel clamps for attaching them to the top of the tank wall. As with all propellers proper location is of the greatest importance.

Propellers are excellent for solving problems requiring high shear or emulsi-



Eastern Industries, Inc.

"Propellers are perhaps the most economical agitators for simple mixing jobs. Three-bladed marine propellers are most common, but two- and four-blade types are used."



Buflovak Equipment Div.

Anchors are slow-speed paddles conforming to the shape of the vessel. They are poor mixers but are most helpful in circulating viscous liquids and dense slurries.

Pfaudler Co.

Because of their simplicity, paddles lend themselves to glass lining. Baffles are not attached to the wall of the tank, but are stationary, vertical shafts.

fication in vessels up to about 1,000 gallons, and for dispersing solids and promoting liquid-liquid reactions in tanks up to 1,500 gallons. They are widely used for blending thin liquids in very large tanks; gasoline is blended by multiple side-entering propellers in tanks as large as 4,000,000 gallons.

They are not very good for dispersing gases in liquids except in very small vessels, and normally are not effective in dense slurries (more than 10% solids) nor in liquids having a viscosity greater than 2,000 cp. By supplying enough power to the propellers and by carefully streamlining the vessel, exceedingly viscous materials such as rubber cement can be agitated; ordinarily, however, other agitators are used for mixing the more viscous liquids.

Standard marine propellers are good for nearly all applications, but special types are available for unusual problems. The two-bladed weedless propeller[18] handles long fibrous materials that would become entangled in the ordinary type, and effectively disperses sticky lumps of solids in a liquid. Perforated propellers[18] are used to break up lumps or balls of material, especially of hard-to-wet solids. Propellers with a large irregular hole cut out of each blade[18] give small displacement of liquid combined with a high rate of shear for shredding and breaking up pulps; saw toothed propellers[18] also give a cutting and tearing action, and displace a large amount of liquid. Folding propellers[18] are available for insertion through small openings; they open by centrifugal force only and therefore have a low efficiency.

PADDLES,[3, 5, 6, 11, 14, 19, 21, 22]

The simplest agitator for liquids is the old-fashioned paddle with one or more sets of horizontal arms mounted on a central vertical shaft. Two, three, or four blades may be used in each set; the blades may be vertical or pitched at an angle. There are almost innumerable modifications in design.

The effectiveness of simple paddle agitators is a matter of some disagreement; but they are certainly popular in the process industries for comparatively light duties, and will continue to be so. Paddles are often less effective for a given job than propellers and require more power, but they are easy to make and modify and are useful over a wide range of conditions. Very often they are fabricated at home.

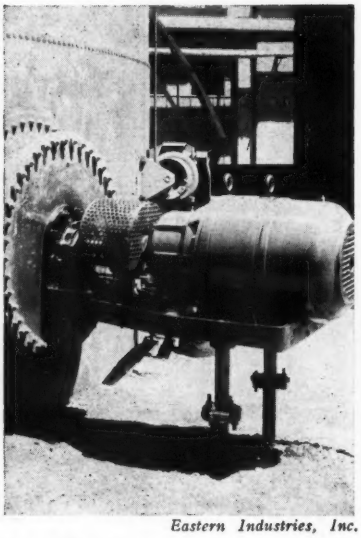
Paddles are made of wood or almost any metal, and are easy to coat with rubber, lead, or glass. They usually operate at speeds from 20 to 60 r.p.m., in vertical cylindrical vessels, often fitted with baffles. In diameter paddles range from 12 inches to 6 feet; the paddle length is usually more than 0.3 of the tank diameter, and may almost equal it. The width is 1/6 to 1/4 of the paddle length.

Comparatively short paddles are good for slow dissolving and dispersion, and for maintaining light or fibrous solids in fairly uniform suspension. They are not usually used for rapid intimate mixing. With longer blades and several coaxial impellers, paddles are useful in agitating viscous masses and dense slurries having viscosities over 700,000 cp. Such masses are too thick to be circulated.

Paddles with pitched blades give some axial and some tangential flow, and operate more like propellers than do those with vertical blades. When set near the bottom of a large tank, especially with a flat pitch to the blades, they are good for cleaning the tank bottom and picking up solids that have settled following decanting and washing operations.

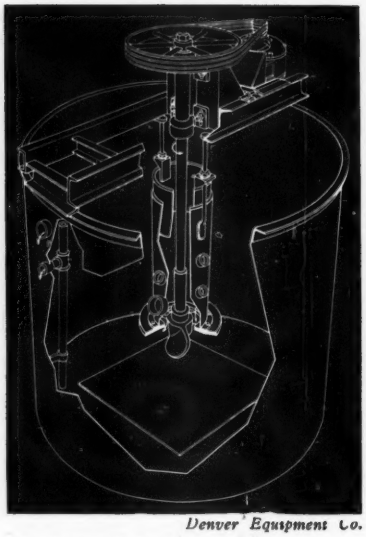
Ordinarily paddles are set about one paddle width from the floor of the tank. In tall narrow tanks two or more paddles are set on the same shaft. When the shaft is longer than 6 or 8 feet an internal steady bearing is usually needed; it is undesirable, as with propellers, but because of the slow speed of the paddles it usually operates fairly well if properly installed. For some purposes more or less elaborate modifications of paddles are used: counter-rotating set of paddles[6]; paddles in combination with anchor agitators[6]; double-motion paddles in which the drive shaft is mounted on an eccentric so that the impeller visits each part of the tank in turn; and travelling paddles for stirring liquids in very large tanks, up to 150 feet long, 40 feet wide, and 30 feet deep.

Because of their simplicity paddles lend themselves to enameling for use in glass-lined vessels. In the Pfaudler system[21] three glass-covered blades are used; the blades are straight or are curved backward away from the direction of rotation. The straight-blade agitator gives some-



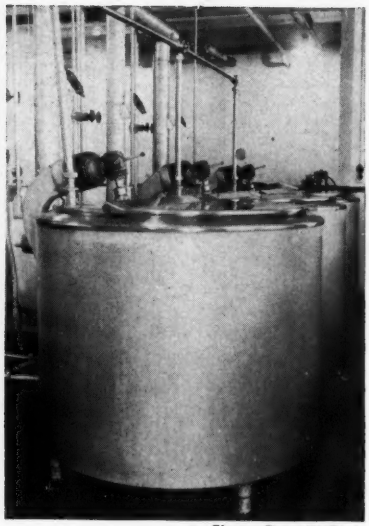
Eastern Industries, Inc.

To avoid long shafts, side entering propellers are used in vary large tanks.



Denver Equipment Co.

The draft tube is set above the impeller and creates strong flow from the surface.



Cherry-Burrell Corp.

For good mixing the propeller must be placed off center to give top-to-bottom turnover.

what more agitation at a given speed; the curved-blade impeller does not overload at high viscosities and creates more shear. Since it is not feasible to attach baffles to the walls of an enamelled tank, baffling is done by one or more stationary vertical shafts carrying projecting blades. The blades are set in a more or less radial position; they may deflect upward or downward, and can be adjusted to meet the needs of the particular problem. Like other paddles, enamelled agitators are useful for all types of agitation. Emulsification, suspension of solids, and dispersion of gases are all satisfactorily carried out in glass-lined equipment.

GATES[3, 5, 7, 14]

A gate agitator consists of a number of horizontal, vertical, and sometimes diagonal blades attached to a rotating central mast. The bulky slow-moving assembly moves liquid without doing much mixing. Sometimes the gate carries a number of vertical blades which pass between stationary vertical fingers projecting from the top of the vessel. The intermeshing creates localized shear which is useful in mixing viscous liquids, as in the solution of cellulose nitrate in various solvents.

A gate is not a mixer at all in the sense of producing a uniform distribution of material, and is useful only where every cubic foot of the liquid in the vessel must be directly disturbed by the agitator.

ANCHORS[3, 5, 6, 14, 19, 21, 22, 24]

An anchor agitator is a type of slow-speed paddle shaped to conform closely to the inside of a vessel. Usually anchors are horseshoe-shaped. They are poor mixers; they are most helpful where viscous liquids and dense slurries are to be circulated, or where the vessel wall must constantly be kept clean of solids to improve heat transfer or to avoid decomposition of material. Because of the close clearance between the impeller and the wall the agitator disturbs solids which settle out; often it is fitted with blades which touch the wall and scrape it clean.[6]

Anchors are operated at speeds under 120 r.p.m. in metal equipment and under 60 r.p.m. in glass-lined equipment. They are used for heavy duty under conditions requiring a low degree of agitation. Because of their shape they are easy to enamel, and are widely used in glass-lined vessels.[21] Sometimes they operate in conjunction with counter-rotating sets of paddles; the paddles provide circulation, and the anchor or "sweep" cleans the walls. Such combinations of impellers may be much more effective than either agitator alone.

TURBINES[11, 12, 14, 16, 18, 19, 20, 22, 25, 26]

Turbines are high-speed agitators extensively used for all types of mixing. They are essentially centrifugal pumps without a casing, submerged in a liquid and operating against negligible back pressure. Six to sixteen fairly short radial blades rotate about a central vertical shaft; the blades may be open or shrouded, flat or curved, vertical or pitched. Except when the blades are pitched, turbines give primarily radial flow, with a desirable change in direction of flow at the impeller. As mentioned before, stator rings and baffles are often used to modify the flow pattern.

Although classed as high-speed mixers, turbines usually operate at less than motor speeds, with peripheral velocities of about 700 feet per minute. They are most often used in vertical cylindrical vessels, although they are good for mixing in irregularly-shaped tanks. They are especially useful in mixing viscous liquids and heavy slurries, and in promoting rapid dissolution and dispersion.

Shafts more than 10 or 12 feet long usually require a steady bearing at the bottom end depending of course on the specific system. A stabilizing ring beneath the turbine is sometimes used.[18] In deep narrow tanks two or more turbines are mounted on the same shaft; sometimes a propeller is used above a turbine to insure full flow to the lower impeller and provide better mixing.

Open turbines with pitched blades[14, 19, 22, 25] are placed centrally near the bottom of the tank, and deflect the liquid down. They are fairly cheap, provide excellent circulation, and are effective in high viscosities. Portable mixers of this type are available.[19] Some manufacturers believe, however, that pitched-blade turbines offer no particular advantages, since for axial circulation they are less efficient than propellers, and for centrifugal action are less efficient than turbines which have vertical blades.

Vertical blades may emanate from a hub[14, 20, 22, 26] or may be quite short and set at the periphery of a horizontal disc.[18, 26] Turbines with straight radial blades are recommended for low cost when made of special alloys and are preferred for lead or rubber covering. They are excellent for intensive dispersions in vessels up to 10,000 gallons, in promoting multi-liquid reactions up to 30,000 gallons, and for blending up to 100,000 gallons of thin liquids. They can handle slurries containing 60% solids with particles as large as 10 mesh; and will agitate liquids of viscosities up to 200,000 cp. If the blades are curved away from the direction of flow the velocity of effluent is considerably reduced. The general range of applications of curved-blade turbines is the same as that of straight-blade turbines, but they may be used to agitate highly abrasive slurries, and the viscosity limit rises to 700,000 cp. Vertical-blade turbines

push the liquid out of the way rather than cutting through it.

Stator rings are often used in conjunction with turbines carrying curved vertical blades. The blades of the stator are curved in the direction opposite to those of the rotor; they eliminate swirl and make the flow truly radial. Turbines with stator rings give intensive dispersions in vessels up to 15,000 gallons. The close clearances result in high shear. In addition, the radial currents persist for considerable distances from the impeller, so that such mixers are useful for agitating in irregular vessels. Agitation is really intense, however, only in the immediate vicinity of the impeller.

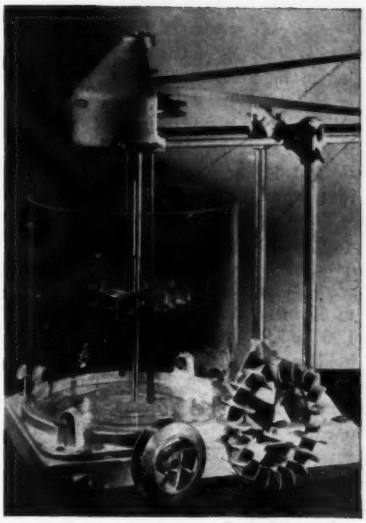
Gases are dispersed in liquids by a type of turbine known as a vaned disc,[18, 26] and a curved blade turbine surrounded by a special stator ring, the Turbo Gas Absorber.[26] In the vaned disc fairly narrow straight vertical vanes are set underneath or at the periphery of a horizontal disc and gas is fed beneath the agitator. The disc prevents the gas bubbles from passing through the impeller without being broken up. In the Turbo Gas Absorber[26] gas may be introduced beneath the agitator, or it may be drawn down from above the surface of the liquid.

Specialized open turbines are available for specific jobs. In the "arrowhead" disperser[18] V-shaped blades pointing in the direction of rotation are used; the high shear and turbulence in the trailing cavity is highly useful in gas-liquid, liquid-liquid, and solid-liquid dispersions. The tilted Turbo impeller[26] increases the vertical blending action in mixing viscous liquids without increase in power consumption over the ordinary type of turbine. The Turbo Disperser[26] contains a screen between the impeller and stator ring which gives a shearing and extruding action for dissolving and dispersing difficult materials. The Homo-Mixer[12] contains no screen, but the close clearances between rotor and stator have much the same effect; this mixer is between an agitator and a colloid mill in function, but does not give the intense homogenization that characterizes a true colloid mill. In contrast to other turbine type mixers, the Homo-Mixer operates at 3600-7000 r.p.m. with a peripheral velocity over 3000 feet per minute. The Agi-Mixer[12] combines a Homo-Mixer and a single or double-motion paddle equipped with scraper blades. It is used for agitating heavy slurries and viscous mixtures. The continuous Turbo Treater[26] is a vertical compartmented vessel with a turbine and stator ring in each compartment. The Nettco Flomix[19] is a small continuous mixer incorporating a turbine and a propeller, installed at a 90-degree bend in a pipe-line. It gives intimate contact between liquids, liquids and gases, or liquids and solids as they flow through the device.

In shrouded turbines[14, 25] the vanes are held between plates; the impeller is similar to that used in most centrifugal pumps. Such turbines give excellent circulation and are most effective in thin liquids, but have few advantages over the simpler open design. They are mostly used for special purposes. The Vissolver[4] is an under-driven turbine rotating near the floor of a shallow tank, in which the liquid discharged from the impeller flows up near the tank walls and is led back to the impeller by a large specially designed draft tube. Its principal use is for the solution of cellulose xanthate in rayon manufacture. The Vortex Fountain Mixer[16] is more like a submerged pump than the usual turbine agitator, since only a small part of the effluent escapes directly from the impeller into the vessel. Most of it discharges into a vaned housing and up a hollow riser surrounding the shaft, and jets upward and downward into the vessel. It produces violent agitation of thin liquids.

RADIAL PROPELLERS[25]

The radial propeller gives the high shear and cutting action of the propeller and the radial type of flow set up by a turbine. Each impeller blade rises from the end of a flat horizontal arm attached to a vertical shaft, and is pitched at an angle, from 10 to 25 degrees, with the tangent to the circle of rotation. The flat side of the blades is not pushed through the liquid as with a straight-blade turbine; instead, the blades cut through the liquid and push it radially away from the impeller.



Turbo-Mixer Corp.

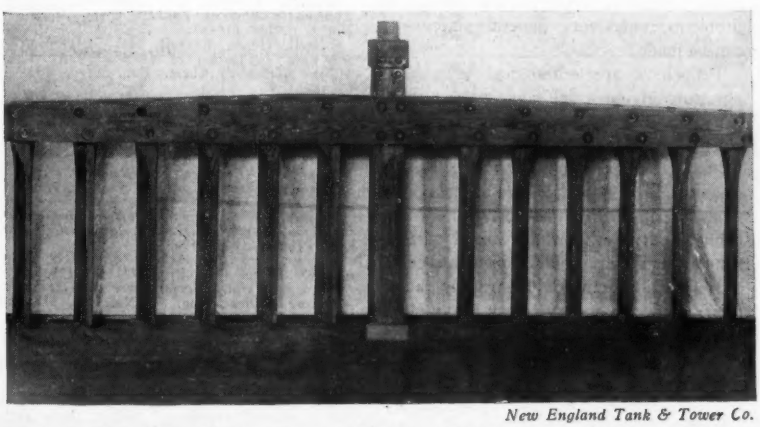
"Turbines are probably the best mixers for general purposes but the initial cost is high."

It is a high-speed agitator, with peripheral speeds of 1,000 to 3,000 feet per minute. With many of the advantages of propellers, it avoids the difficulty of critical location in a container. It provides excellent circulation, is effective in viscous liquids, and gives shear of high intensity in as much as 5,000 gallons of liquid. Slurries containing up to 60% solids with particles as large as 10 mesh, and liquids with viscosities up to 200,000 cp. may be agitated with radial propellers.

CONES[20]

Cone agitators are less commonly used, for it is only recently that their value for agitating heavy slurries has been recognized. They consist of a vertical section of a cone, small end upward, surrounding a central vertical shaft. They are often mounted in pairs on the same shaft with the larger ends facing each other. Their length roughly equals the diameter of the vessel.

Flow is generated by the centrifugal force developed between the two throats of the cone. In a way the cone operates like a combination of turbine and draft tube, but the vertical currents are much stronger than with a turbine alone, and there are no sudden changes in the direction of flow. For this reason cones can agitate exceedingly dense slurries, even containing 10% of fibrous solids, in volumes up to 50,000 gallons. Baffles are used with thin liquids, but normally the slurries handled are so dense that none are needed.



New England Tank & Tower Co.

"A gate is useful only where every cubic foot of liquid must be directly disturbed."

DISCS[1, 9, 23]

Disc agitators consist of one or more horizontal discs mounted on a shaft rotating at high speed. They generate more or less tangential flow by surface friction. When single discs are used their action is aided by corrugations or narrow vertical blades, or by angular projections at the periphery.

The Cowles dissolver[9] carries a single disc with angular teeth at the circumference, bent alternately upward and downward. The disc diameter ranges from 8 to 30 inches; the peripheral speed from 1,000 to 7,000 feet per minute. It is mostly used in the paint and lacquer industries for dispersing resins, guncotton, dyes, pigments, fillers and other materials. Since it operates in viscous media considerable power is required; for standard size units the motor size required varies from 5 to 20 HP.

In the Dispersall[1] a disc with curved radial ribs, rotating at the bottom of the tank, forces liquid through the disc and a stator ring at the bottom of a stationary inner cylinder. The disintegrated and dispersed material is then impelled upward by the circulating movement, set up between the tank wall and the inner cylinder. Vertical slots in the inner cylinder have outwardly projecting baffles to direct the flow into the inner cylinder to be forced downward to the ribbed mixing disc. Motor size on standard units, whose volume ranges from 0.5-330 gallons, varies from 0.25 to 25 HP.

Single discs give exceedingly intense shear and excellent attrition in small vessels, up to about 1,000 gallons. They are used for rapid and thorough dispersions of solids in viscous liquids and pastes, for emulsifying, and for disintegration of light fibrous solids.

The Velofin[23] carries several parallel flat discs, and usually operates at full motor speed. It is light and self-balancing, and can be used with very long shafts without a steady bearing. It operates in any position and is effective in vessels of any shape and size. Because of the complex pattern of differential flow between the discs, the impeller is said to give very rapid and intense mixing.

SPECIAL MIXERS

For specific jobs a great number of mixers have been proposed and used. Some of them, like the Vissolver,[4] have been described. Other devices are on the market for use in a number of operations, of which mixing liquids may be one.

Whippers or cage beaters[2, 18] of various kinds are used to beat two liquids into a fine state of division or emulsification, as in making whipped cream, mayonnaise, and similar products. The standard beater has a cutting and beating action; it is usually used in conjunction with a propeller which circulates the mass. The studded cage beater carries numerous projecting rods, and gives a violent cutting and shredding action to certain emulsions and pulps.

The Versator[8] consists of a shallow horizontal bowl rotating inside a vacuum or pressure chamber. Liquid is fed to the center, flows under a ring, and travels radially as a film across the bowl. A scoop tube removes it from the periphery. Liquids of all viscosities may be blended, emulsified, aerated, or degassed in this device.

For continuous processing of viscous materials the Marco Kom-bin-ator[17] or Homogenizer may be used. Material is forced by a gear pump through a series of rotors and stators of various designs; the combination of intense hydraulic and mechanical shear gives thorough blending, emulsification, or dispersion, even of highly viscous liquids and pastes, in a matter of seconds.

The Votator[13] is primarily a heat-transfer device, but is sometimes used for blending. A hollow core rotates with small clearance inside a stationary jacketed cylinder; liquid flows as an agitated film between the rotating and stationary elements. Effective blending of viscous liquids is done continuously by this means, with or without considerable changes in temperature.

The mixing head of the Oakes continuous mixer[2] consists of a front and back stator with a rotor operating in a vertical plane. The material enters at the center of the back stator and is acted on by rings of lugs on the rotor. These lugs on the rotor operate between lugs on the front stator, and discharge the mixed material through an opening in the center of the front stator. Time of mixing is approximately 3-5 seconds and air or gas may be injected with the material as it enters the back stator.

SELECTION OF AGITATORS

When confronted with an agitation problem the designer or process engineer asks himself, "What kind of agitator shall I use? How big should it be? How much power will it draw? What accessories are needed?" A descriptive review such as this cannot hope to provide all the answers; because of the infinite variety of problems, only very general statements can be made.

Propellers are economical high-speed agitators giving axial flow, and are useful where high localized shear is desirable. Paddles operate at slow speeds, are easy to make, and are useful in many applications where mild agitation is needed. Turbines are probably the best mixers for general purposes, but the initial cost is somewhat higher. Radial propellers combine a cutting action with strongly radial flow; cones are good for very heavy slurries; and discs produce a high degree of shear.

For details of the design of agitators and accessories, the power required by various types, and economic factors to be considered, the references listed below should be consulted. The selection of the proper mixer, especially for difficult problems, requires considerable experience, and it is always wise to consult the manufacturers before the design of the vessel has proceeded very far. Making early use of their experience and recommendations will save many headaches when the unit is finally put on stream.

ACKNOWLEDGMENTS

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1. Abbe Engineering Co., 50 Church Street, New York 7, N. Y.
2. American Machine & Foundry Co., 485 Fifth Ave., New York 17, N. Y.
3. Artisan Metal Products, Inc., 73 Pond St., Waltham 54, Mass.
4. Baker Perkins, Inc., Saginaw, Mich.
5. Bethlehem Foundry & Machine Co., Bethlehem, Pa.
6. Buflovak Equipment Div. of Blaw-Knox Co., Buffalo 11, N. Y.
7. Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6, Ill.
8. Cornell Machine Co., 101 Park Ave., New York 17, N. Y.
9. Cowles Co., Inc., Cayuga, N. Y.
10. Denver Equipment Co., 1400 Seventeenth St., Denver 17, Colo.
11. Eastern Industries, Inc., 296 Elm St., New Haven 6, Conn.
12. Eppenbach, Inc., 45-10 Vernon Blvd., Long Island City 1, N. Y.
13. Girdler Corp., Votator Div., Louisville 1, Ky.
14. International Engineering, Inc., Dayton, O.
15. L. O. Koven & Bro., Inc., 154 Ogden Ave., Jersey City, N. J.
16. Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass.
17. Marco Co., Inc., Wilmington 50, Del.
18. Mixing Equipment Co., Inc., 1047 Garson Ave., Rochester 9, N. Y.
19. New England Tank & Tower Co., 87 Tileson St., Everett 49, Mass.
20. Patterson Foundry & Machine Co., East Liverpool, Ohio.
21. Pfaudler Co., 1000 West Ave., Rochester 3, N. Y.
22. H. K. Porter Co., Oliver Bldg., Pittsburgh, Pa.
23. H. E. Serner, 342 Madison Ave., New York 17, N. Y.
24. F. J. Stokes Machine Co., Philadelphia 20, Pa.
25. Struthers-Wells Corp., Warren, Pa.
26. Turbo Mixer Corp., General American Transportation Corp., 10 E. 49th St., New York 17, N. Y.

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Serner, *"Application and Design of Mixing Equipment,"* Chem. Eng. *55*, No. 8, p. 118 (1948).

Valentine and MacLean, in Perry's *"Chemical Engineers Handbook,"* 2nd ed., New York, McGraw-Hill, 1941, pp. 1527-1582.

This AGITATOR plus This BAFFLE...

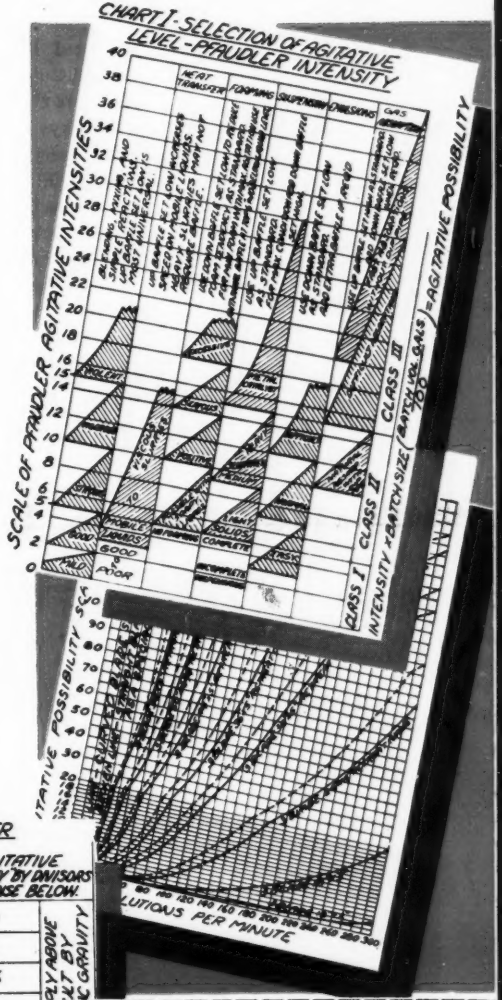
MEETS PRACTICALLY *Every* MIXING REQUIREMENT!

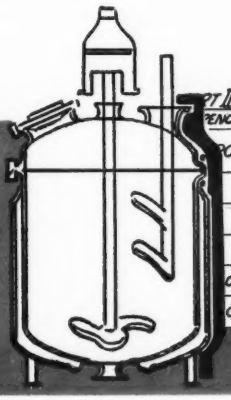
The *Pfaudler Agitative System* takes the guesswork out of agitation . . . enables you to *predetermine* specifications with simple calculations.

For years, Pfaudler engineers have been classifying mixing actions obtained with various types of glass-covered agitators and adjustable baffles in glass-lined reactors. Through these studies, definite mixing principles have been established as a practical guide in predetermining correct agitation specifications for both pilot plant and full scale operations.

Each factor in agitation—agitative intensity—size of agitator in relation to size of vessel—R.P.M. of agitator—H.P. required—has been worked into three selection charts. Reference to these charts is made in accordance with the type of agitation required—simple blending, heat transfer, suspensions, emulsions, gas absorption, etc.

By cross reference to the charts and with some elementary arithmetic, you arrive at the proper agitation specifications with surprising accuracy. And the use of *standard* Pfaudler equipment keeps costs lower. A full description of the system as well as instructions on how to use the charts are yours for the asking. Use form below.





STANDARD PFAUDLER REACTORS HANDLE:
- SIMPLE BLENDING
- HEAT TRANSFER
- SUSPENSIONS
- EMULSIONS
- GAS ABSORPTIONS

CHART III - TO DETERMINE REQUIRED HORSE POWER
...ENCE - PERRY'S HANDBOOK FIG M, PAGE 1289

...POISE	COMMON MAT'L 68°F	PERCENTAGE OF POWER REQ'D	DIVIDE "AGITATIVE POSSIBILITY" BY DIVISORS FOR CENTIPOISE BELOW.
	WATER	100	20
	MED. HEAVY MOTOR OIL	105	19
	GLYCERINE CASTER OIL	120	16.6
...0	KARO CORN SYRUP	150	13.3
...0	MOLASSES	240	8.3

...LY ABOVE ...LT BY ...C GRAVITY

THE PFAUDLER CO.
Dept. CI-3, Rochester 4, N. Y.

Send me details covering the "Pfaudler Agitative System."

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Pfaudler

THE PFAUDLER CO., ROCHESTER 4, NEW YORK

ENGINEERS AND FABRICATORS OF CORROSION RESISTANT PROCESS EQUIPMENT

Glass-Lined Steel . . . Stainless Steels . . . Nickel . . . Inconel . . . Monel Metal

STANDARD OIL COMPANY (Indiana)
keeps its products pure
-in drums equipped with Tri-Sure Closures

INDOPOL Polybutenes produced by Standard Oil Company (Indiana), and marketed by their subsidiary, the Indoil Chemical Company, are made for such exacting uses that it is imperative that they be kept absolutely free from impurities. So Standard of Indiana plays safe — takes no chances with seepage, dust or tampering — by equipping every drum with Tri-Sure Closures*.

For over 10 years, Standard Oil Company (Indiana) has given its fine line of chemical and petroleum products the protection of Tri-Sure Closures — to *maintain* the purity of its products from the plant to the purchaser. And, like other leading shippers, they rely on *Tri-Sure* protection because the Tri-Sure FLANGE is an integral part of the drum, as strong as the drum itself . . . the Tri-Sure PLUG screws securely into the flange to effect a tight closing . . . the Tri-Sure heavy-gauge SEAL, with cork gasket, provides a leakage-proof covering which cannot be removed unless it is deliberately destroyed.

Play Safe by Specifying "Tri-Sure Closures" on Every Drum Order

*The "Tri-Sure" trademark is a mark of reliability backed by 26 years serving industry. It tells your customers that genuine Tri-Sure flanges (inserted with genuine Tri-Sure dies), plugs and seals have been used.

TURBINE OILS

TRANSFORMER OILS

MOTOR OILS

INDOPOLS†

FINE CHEMICALS

WHITE MINERAL OILS

†Reg. U. S. Pat. Off.

AMERICAN FLANGE & MANUFACTURING CO. INC.
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

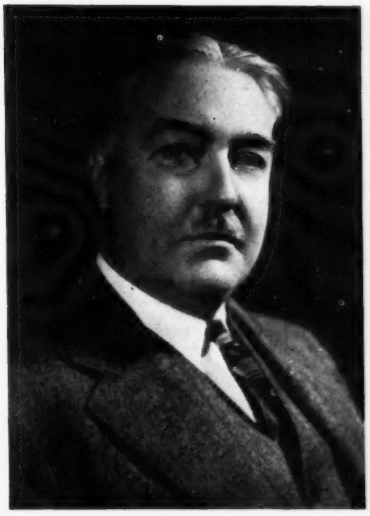
Tri-Sure
Reg. U. S. Pat. Off.
CLOSURES

THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE

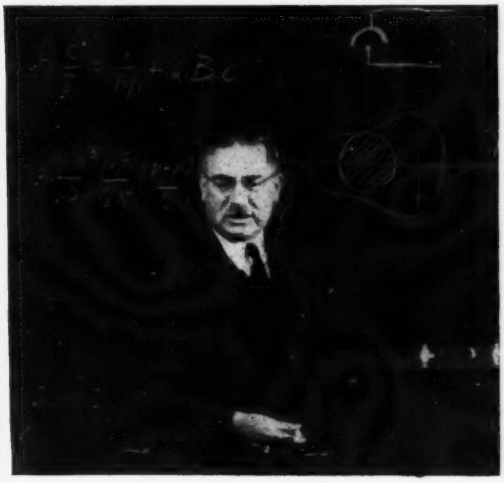
G. V. Slottman, appointed director of research and engineering for the Air Reduction Co. For the past year he has been technical assistant to the vice president in charge of sales.



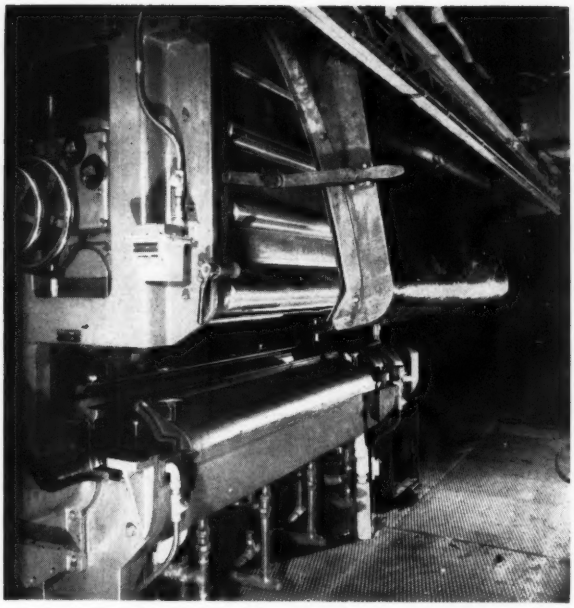
Foster Dee Snell, president of Foster D. Snell, Inc., to receive the Gold Medal of the Society of Chemical Industry, London, for 1949.

Sam L. Brous, named marketing manager of the General Electric Co.'s Chemical Department. He had been with B. F. Goodrich Co., where he was manager of the Chemical Sales Dept.

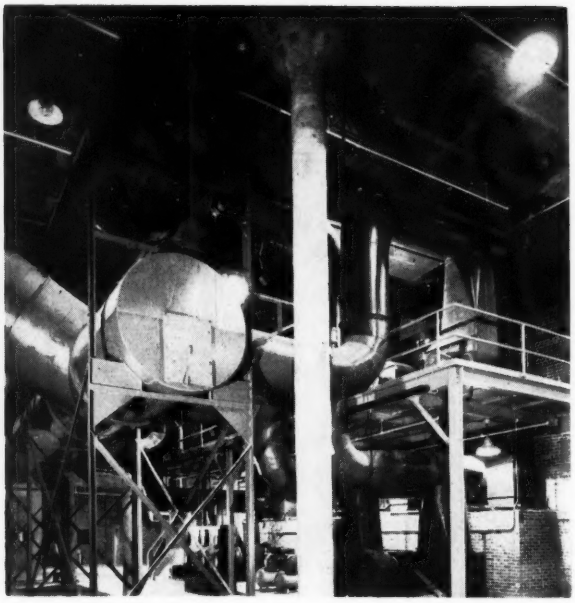
H. B. Hass, named manager of research and development, General Aniline and Film Corp. He has been head of the Chemistry Dept., Purdue University.



Peter J. W. Debye, Cornell, awarded the 1949 Willard Gibbs Medal, ACS, for his work on electrical charges of molecules.



The ester and hydrocarbon solvent in the ink is volatilized by warm air and picked up in hoods which are fitted over press units.



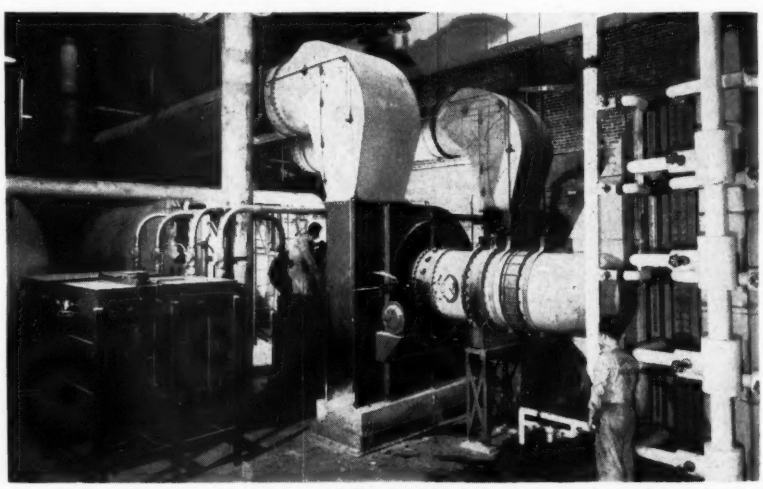
Solvent-air mixture drawn from the press room is collected from the various smaller units and sent into main ducts, top and left.

Recovering Ink Solvents

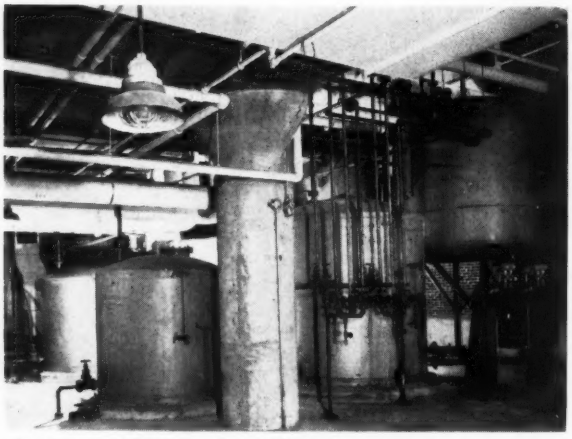
The Philadelphia Inquirer recently opened the world's largest and most modern rotogravure printing plant, designed to recover huge quantities of roto inks containing volatile solvents.

The solvents, consisting of esters and hydrocarbons, are collected at the presses and sent on to the recovery system which employs vapor-absorbent activated carbon. It is a two-unit system, one-half recovers the "high-speed" solvent used in the inks for newspaper rotogravure stock and one-half recovers the "low-speed" solvent used in the inks for coated stocks.

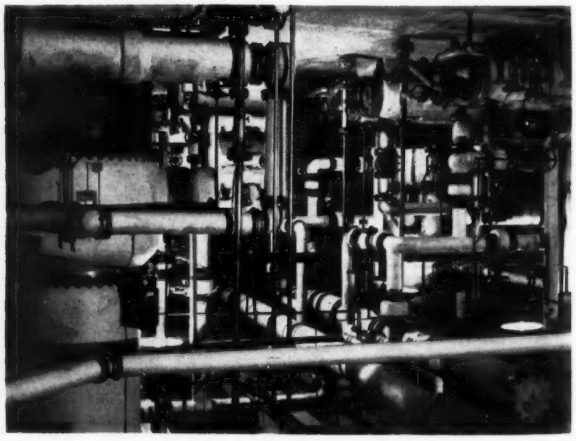
(Illustrations: Carbide and Carbon Chemicals Corp.)



The mixture next goes to tempering and filtering chamber, extreme right, and then to one of the six adsorbers, in the background. The adsorbed material is stripped by steam.



Stainless steel-lined, continuous decanters separate the aqueous and hydrocarbon layers after the mixtures are condensed and cooled.



Distillation columns, which extend to top of building. The solvent goes from here to storage and then back to the ink mix room.

ISCOOPERATION News

The Voice of
INNIS, SPEIDEN & CO.

117 Liberty Street, NEW YORK 6, N. Y. • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • GLOVERSVILLE • PHILADELPHIA

Due to present conditions some items listed may not be immediately available.

ABSORPTION BASE, Cans, Drums.

AEROSOL BOMB—5 lb. cylinders.

ACIDS: *Acetic* — 56% Glacial. Bbls. & Carboys.
Boric — 99½% and U.S.P. Pow'd. Gran. Bbls., 300 lbs. Bags, 100 lbs.
Formic—85% and 90%. Water White, Carboys, 130 lbs.
Oxalic — 99½% Crys. Bbls., 300 lbs. Kegs, 125 lbs.
Tannic—Tech. and Conc. Bbls., 300 lbs.

ADSORBOL

ALGIN

ALUM — *Ammonia, Potash* — Tech & U.S.P. Bbls. & bags.

ALUMINA — *Sulphate* — Iron free and Com'l Bags, 100 lbs.

AMMONIUM—*Bifluoride*—Drums, 300 lbs.
Carbonate — Pow'd. and Lump. Drums & Kegs.
Chloride (Sal Ammoniac)—White Gran. 99-100%. Bbls., 275 lbs. Bags, 100 lbs.

AQUA AMMONIA—Drums, 825 lbs.

BARIUM HYDRATE — White, Crys. Bbls., 400 lbs. Bags, 100 lbs.
Barium Sulphate—(Blanc Fixe) Extra Fine. Bbls., 250 lbs.

BLANC ROUGE — White Optical Grinding Rouge. Bbls., 200 lbs. Drums, 100 lbs., Kegs, 50 lbs.

BLEACHING POWDER — 35-37%. Drums — 100-333-825 lbs.

BORAX — Pow'd. Gran. Bbls., 300 lbs., Bags, 100 lbs.

CALCIUM CHLORIDE—Flake. Bags, 100 lbs.

CARBON TETRACHLORIDE — Drums, 700 lbs.

CASEIN—Gran. Bags, 200 lbs.

CHALK — Precipitated — Light and Medium. U.S.P. Bags.

CHINA CLAY—Imported. Bags, 60 and 140 lbs.

CLAY — Bleaching and Decolorizing.

CHLORIDE OF LIME—See Bleaching Powder.

CHLORPICRIN—See Larvacide.

CRYSTAMET — See Soda Metasilicate Penta Hydrate.

DRYMET — See Soda Metasilicate Anhydrous.

DRYORTH—See Soda Orthosilicate.

DRYSEQ—See Soda Sesquisilicate.

ELECTROTYPERS WAX

EMULSIFIERS *(Cosmetic)*—Cans, Drums.

EPSOM SALTS — Tech. U.S.P. Bags.

FERRIC CHLORIDE — Lumps and Crystals. Bbls., 500 lbs.
Ferri Chlor—Ferric Chloride for sewage treatment. Bbls., Drums, Kegs.

FLINT — Prime white, soft decomposed. Bulk or in Bags, 50 lbs., 100 lbs.

FORMALDEHYDE—40% U.S.P. Bbls., Kegs, and Drums.

GLAUBER'S SALT — Calcined — Bags — 100

GUMS:
Arabic — Amber sorts, Pow'd. and Grained. Bags and Bbls.
Ghatti.
Karaya—Pow'd., Crystal and Whole.
Locust Bean—Powdered.
Tragacanth—Ribbon, Flake and Powder.

IRISH MOSS—Whole, Bales. Pow'd. Bbls.

IRON CHLORIDE—(See Ferric Chloride).

ISCOBROME — 40-250-450 lb. drums.

ISCOBROME "D"—55 gallon drums.

ISCO INSECTICIDE SPRAY—1 Gallon Cans and 5, 10, 30 and 55 gallon drums.

KAOLIN—ISCO Excel. Imported. Bolted Bbls., 300 lbs.

LACTOSE—(See Milk Sugar).

LANOLIN—Hydrous and Anhydrous—U.S.P., Domestic. Drums 100 and 400 lbs.

LARVACIDE — *(Chlorpicrin)* — Fumigant, Cylinders—25, 50, 100 and 180 lbs. and 1 lb. Bottles, each in safety can, 6 or 12 to wooden case.

LEATHER DRESSINGS and FINISHES—Bbls., 50 gals.; Kegs, 10 gals.

LIME—HYDRATED—Chem. Grade. Bags, 50 lbs.

MAGNESITE—Ground, Domestic.

MAGNESIUM—Carbonate, Light. Bags, 50 lbs. U.S.P. Bbls., 70 lbs.
Chloride—Flakes, Bags, 100 lbs.
Oxide Heavy—Bbls., 400 lbs.
Stearate.
Sulphate—See Epsom Salt.

METHYL BROMIDE — in cylinders 50, 120 and 175 lbs. Cans, 1 lb.—12 to case.

MILK SUGAR — Sheffield Brand — Tech. and U.S.P. Bbls., 200 lbs.

MILL SPRAY — (See SERVACIDE and ISCO Insecticide Spray).

MIRBANE OIL—(Nitro Benzol). Prime Light Yellow. Drums, 600 lbs.

NAPHTHALENE — Prime White, Chip. Bags or Bbls., Flakes and Balls. Bbls., 200 lbs. Also in small packages, cartons, etc.

ORTHO-DICHLOROBENZENE—Commercial packages.

PARA-DICHLOROBENZENE — Commercial packages.

POTASHES:
Bichromate—Bags, 100 lbs.
Carbonate — Calcined, 99-100%. Bbls., 325 lbs.
Carbonate — Hydrated, 83-85%. Bbls., 400 lbs.
Carbonate — Liquid, 47-48%. Returnable Drums, 675 lbs.
Caustic, Solid—Fused 88-92%. Drums, 700 lbs.
Caustic, Liquid Clarified—45% KOH. Tank Cars and Drums, 675 lbs.
Caustic — Special low chloride grade. Tank Cars and Drums.
Caustic — Flake. Drums, 100-225-400 lbs. Ground, Drums, 100-225-500 lbs.
Caustic — ISCO American Selected Walnut. Drums, 100-225 lbs.
Chlorate—Pow'd and crys. drums, 220-300 lbs.
Muriate — (Chloride) 99%. Bags, 100 lbs.
Nitrate — Double Ref'd. Gran. 99½-100%. Bbls., and Bags.
Permanganate — U.S.P. and Technical. Crystals. Drums, 110 lbs.

SERVACIDE INSECTICIDE SPRAY—1 Gallon Cans and 5, 10, 30 and 55 Gallon.

SILICA—ISCO Carrara Pure Soft Decomposed. Prime white and uniform — 99½% pure; 325 mesh. Bags.

SODAS:
Acetate — *Anhydrous* — Drums, 265 lbs.
Ash — 58%, light and dense. Bags, 100 lbs.
Bicarbonate Powder — U.S.P. and Technical. Bags, 100 lbs.
Bichromate—Bags, 100 lbs.
Bisulphite — Pow'd. 62-65%, Bbls., 430 lbs.
Caustic — Solid-Fused-76%. Drums, 700 lbs.
Caustic Flakes — 76%. Drums, 100 and 400 lbs.
Caustic Liquid — 50-73%. Drums and Tank Cars.
Formate—Bags 100 lbs.
Hydrosulphite Powder—Drums, 250 lbs.
Metasilicate — Regular. Penta Hydrate. Bbls., 325 lbs. and 100 lbs. Paper Bags. Anhydrous—Drums, 400 lbs.
Bifluoride or Acid Fluoride — Bbls. 350 lbs.
Nitrite — Bbls., 400 lbs.
Orthosilicate—Drums, 400 lbs.
Phosphate—Dibasic and Tribasic—Bags, 100 lbs.
Sesquisilicate — Technically anhydrous — Drums, 400 lbs. net.
Silico Fluoride—Bbls., 400 lbs.
Sulphate—Anhydrous (Glauber's Salt)—Bags, 100 lbs.
Sulphide — Solid, and Flake. Drums, 300-400 lbs.

STEARATES:
Aluminum. Barium. Calcium. Lead. Lithium. Magnesium. Zinc.

SULPHUR DIOXIDE — Extra dry Esotoo for refrigeration. Commercial for bleaching.

SURFACE ACTIVE AGENTS

TALC: All 50 lb. Bags
ISCO *Silver Lake I S.*
ISCO *Silver Lake N S.*
ISCO *Silver Lake L S.*
Trinity Superfine—Trinity Supreme
I S Cosmetic
Sierra Cosmetic—Sierra White
Steatite Grades
No. 107

TITANIUM POTASSIUM OXALATE — Kgs.

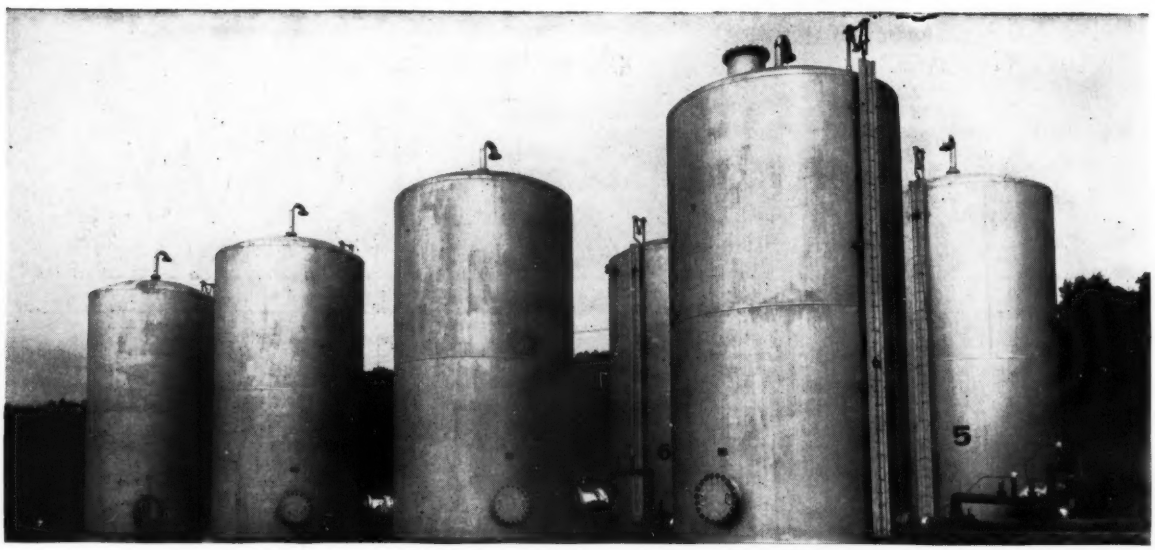
WAXES:
Beeswax, White, Sun-Bleached — Refined. Yellow.
Beeswax Substitute—Light and Medium.
Candelilla—Crude and Refined. Lump, Flake, Powdered.
Carnauba—No. 1 Yellow, No. 2 Yellow, No. 3, N. C., No. 3 Chalky — Refined in the Flake, Lump and Powdered. Bags, 150-200 lbs.
Ceresine—Orange, Yellow, White. All melting points. Bags, 110 and 200 lbs.
Japan Wax Substitute, No. 525
Montan-Bohemia Brand
Montan Wax Substitutes, Powdered — Lump and Bleached.
Molding Wax for Electrotypers.
Ouricury—Domestic—Refined. Bags, 150 lbs
Ozokerite—Domestic—White and Yellow. All melting points.
Spermaceti
Wax Substitutes—All Types.

WETTING AGENTS

ZINC CHLORIDE—Gran. 98-100%. Drums, 600-100-50 lbs.

ZINC STEARATE—U.S.P. Cartons, 50 lbs.

ZINC SULPHATE—Granular 89%. Bbls and Bags.

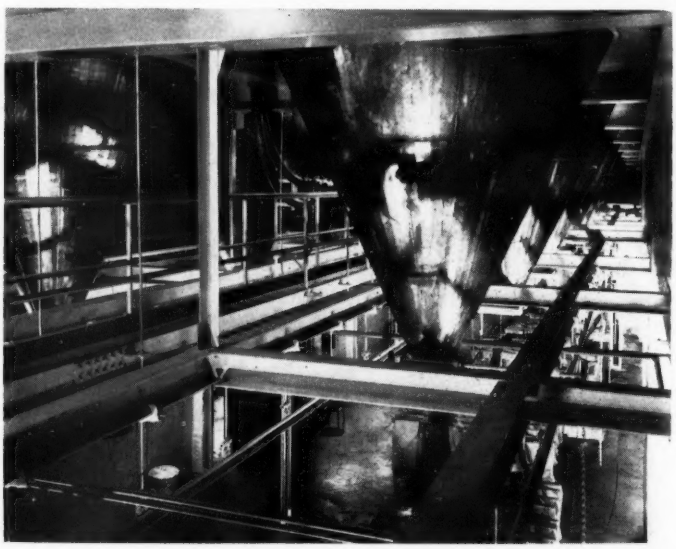


Plasticizers are delivered to outside storage tanks. Heaters and circulating pumps maintain a constant supply to the compounding room.

Vinyl Plastics Plant

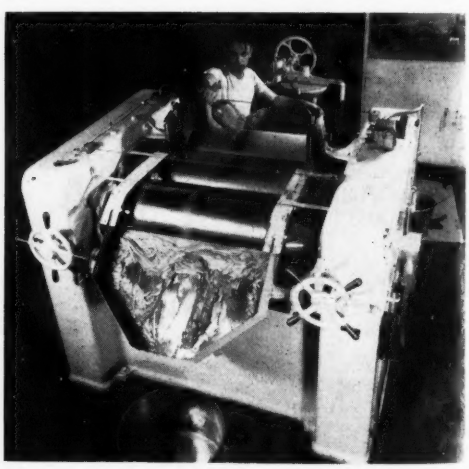
Bakelite Corp. has just started operations at its new plant at Ottawa, Ill., for compounding and processing Vinylite plastic flexible film and rigid sheet. The unit will be of especial advantage to Midwestern fabricators of these materials. Carbide and Carbon Chemicals Corp. has also expanded its capacity for the production of Vinylite resins at South Charleston, West Va., and Texas City.

The new plant is claimed to be the most modern plastics fabricating plant in operation. Resins are stored in aluminum bins at the top of the building, and are drawn from the bottom of the bins directly to the compounding floor. Plasticizers are stored in outside storage tanks from which they are pumped to the compounding room. These are blended with other ingredients, and then delivered to one of the six calenders



The base of each of the resin storage bins tapers conically above the blending room to facilitate resin removal to weigh-up lorries, suspended on movable tracks.

Ingredients used in relatively small amounts, such as colors, lubricants and stabilizers, are accurately weighed in a dustproof hood to prevent contamination.



Certain compounding ingredients are dispersed on three-roll mills prior to blending to assure uniformity.

(A Quick Quiz on modern pH advancements)

Do you know these important facts about BECKMAN pH CONTROL?

Do you know...

That Beckman pioneered modern glass electrode pH equipment?

Until Beckman pH instruments were developed, glass electrode pH equipment was a cumbersome, complicated laboratory curiosity. It was Beckman that pioneered today's simple, compact, highly accurate and completely dependable glass electrode pH equipment!

That Beckman pioneered virtually every major development in modern glass electrode pH equipment?

Such far-reaching advancements as the High pH Glass Electrode . . . the High Temperature Glass Electrode . . . the Unusually Rugged "X-9" Glass Electrode . . . as well as a wide range of other vitally important advancements in glass electrode pH instrumentation, were *all* pioneered by Beckman. *Many of these advancements are still available exclusively in Beckman equipment!*

That Beckman offers the industry's most complete line of glass electrode pH instruments?

Included in the complete Beckman line are instruments specially designed to combine the high precision and wide versatility necessary for advanced research, medical and laboratory applications . . . others that combine maximum simplicity and high accuracy with complete portability for plant and field applications . . . still others that combine maximum simplicity and high accuracy with the plug-in convenience of full AC operation . . . plus *completely automatic* pH equipment for continuous pH indication, recording and control on large-scale processing applications.

That Beckman also provides the industry's most complete line of modern glass electrodes?

Although glass electrode pH instruments are the most efficient pH equipment obtainable, no glass electrode pH instrument is better than the versatility, accuracy and dependability of the electrode assemblies available for use with it.

Beckman provides the industry's most complete line of glass electrodes for use with Beckman pH instruments—a type of electrode assembly to meet every industrial, research, laboratory and field requirement!

That there are so many money-saving applications for Beckman pH control that you may be losing important profits unless you make a complete investigation of your operations?

There is pH wherever there's water, water solutions, moist pastes, sludges, slurries or other moisture-containing substances. And wherever there is pH, chances are the operation can be done better . . . with greater uniformity and less waste at lower overall cost . . . by Beckman-controlling the pH of the various processing operations.

WHETHER *you manufacture food products or treat sewage . . . do metal plating or refine crude oil . . . make textiles or process ore — in fact, no matter* WHAT *your field of operation . . . if you have not yet determined whether Beckman pH Control can be used to advantage in your operations — possibly is already* BEING *used to cut costs by your competitors — let us study your processes and make helpful recommendations. No obligation, of course.* BECKMAN INSTRUMENTS, NATIONAL TECHNICAL LABORATORIES, SOUTH PASADENA, 17, CALIFORNIA.

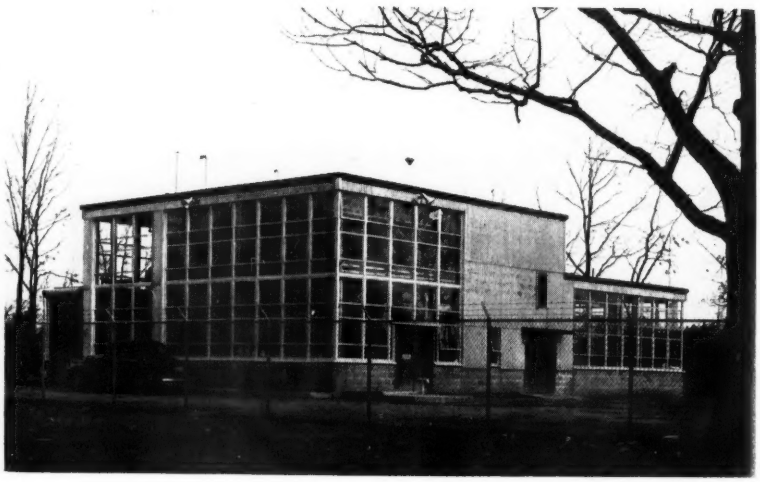
For an informative, non-technical outline of modern pH control — what it is and how it's used — send for this free booklet "What Every Executive Should Know About pH."

BECKMAN

INSTRUMENTS CONTROL MODERN INDUSTRIES

pH Meters and Electrodes — Spectrophotometers — Radiation Meters — Special Analytical Instruments

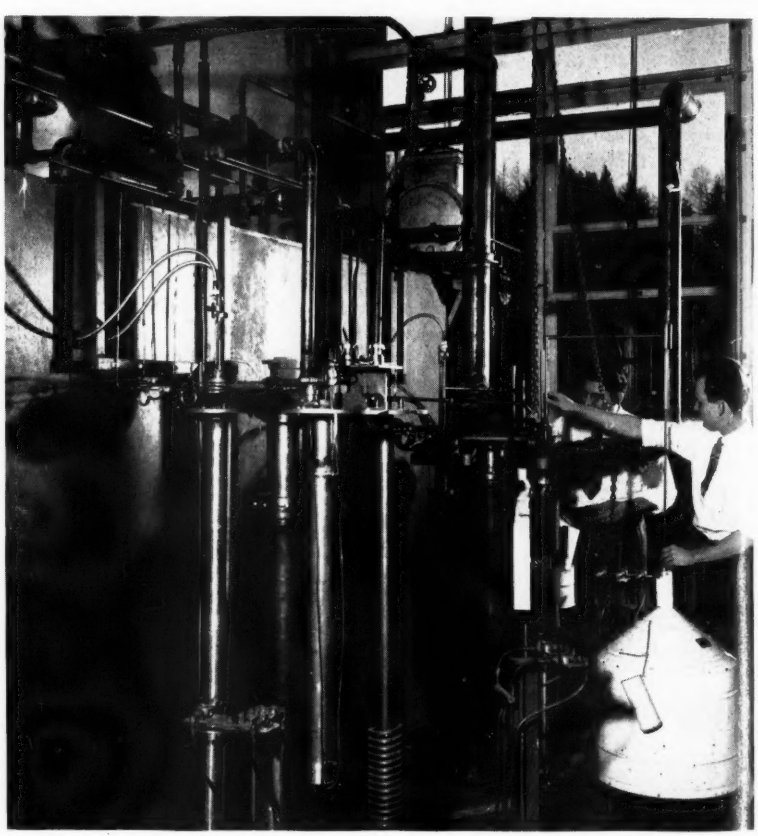
Low Temperature Lab

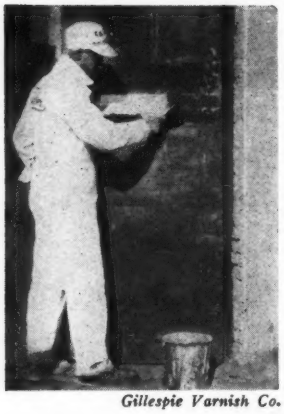


A new $250,000 low-temperature laboratory has just been completed by the General Electric Research Laboratory at Schenectady, N. Y. It will be devoted entirely to research at temperatures close to absolute zero, part of continuing work to discover more about the behavior of matter at low temperatures.

The taller half of the building (above) is filled with equipment for liquefying helium and hydrogen, to be used as cooling agents for experiments. The plant is expected to produce about 7 gallons of liquid hydrogen and 2 gallons of liquid helium an hour. Below is the network of coils, pipes, and valves for the final liquefying operation. These are enclosed in vacuum-insulated jackets when in use.

The laboratory is especially designed to provide maximum safety in work with hydrogen, which is explosive when mixed with certain other gases.





Gillespie Varnish Co.

Formulation of Paint Removers

by CORNELIA T. SNELL
Foster D. Snell, Inc.
New York City

BETTER SOLVENT-BASED paint strippers cope with tougher coatings. Both these and alkali types find a ready industrial and retail market.

REMOVING paint is the first step in doing an efficient refurbishing job. Although mechanical methods such as scraping, sanding or burning with a blow torch are useful, they often are too time-consuming, do not give complete removal, and result in a damaged surface. Properly formulated chemical paint strippers can loosen coatings from surfaces without injuring them, and with sufficient savings in labor to make the cost of the materials relatively slight.

Since paint removers work by penetrating the coating of paint and loosening its bond upon the surface to be cleaned, it follows that the better the paint, the better must be the stripper. Tremendous advances in the field of paints, varnishes and other protective coatings during the war also necessitated some progress in the development of paint strippers. Many of the new finishes were tougher, more adherent and more resistant to deterioration than those previously used. With such products more efficient paint removers were required.

Removers have consisted of either aqueous solutions of caustic alkali or mixtures of organic solvents, and this broad division into types has continued despite developments. The latter types, however, were limited generally to such low-cost liquids as alcohol, benzene and acetone until the more resistant films came along. Now these less effective solvents have been replaced to a large extent by complex mixtures that put the necessary "bite" into new formulations.

AQUEOUS AGENTS

A strong solution of caustic soda has a disintegrating action on varnish or paint by saponifying the fatty acid constituents in the coating. The solution may be used as a bath in which painted articles are suspended until the paint is soaked off; or it may be brushed or sprayed onto a surface.

For use on walls, products are usually not simple solutions of alkalies but contain some paraffin oil emulsified with soap, and a thickener such as glue or starch. Paint removers need to be somewhat viscous so that when brushed onto vertical walls, they will not drain off immediately. Enough thickener is used to give a contact period long enough for the remover to attack the coating.

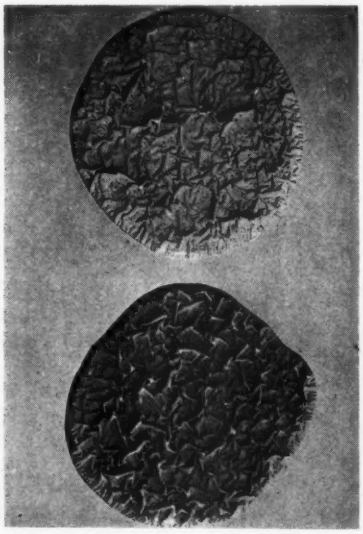
An alkaline product may not remove the paint completely but may soften it. The coating can then be removed by mechanical scrubbing or by hosing if other conditions permit. If the solution is to be used on wood, it must be in contact for a short enough period to do no harm to the underlying wood. This calls for a quick-acting solution that must contain about 20-25 per cent of caustic soda in the product as applied. It is ordinarily used very hot and may be applied to alkali-resistant metals and alloys as well as to wood. All alkali must be rinsed off since caustic remaining behind would saponify linseed oil in paint applied later, and lead to rapid breakdown of the paint film.

Strong alkalies can be used on iron, steel, brass and copper, but not on aluminum, zinc and cadmium. With this last group of metals, cresylic acid can be used as a paint stripper without harming the metal itself.

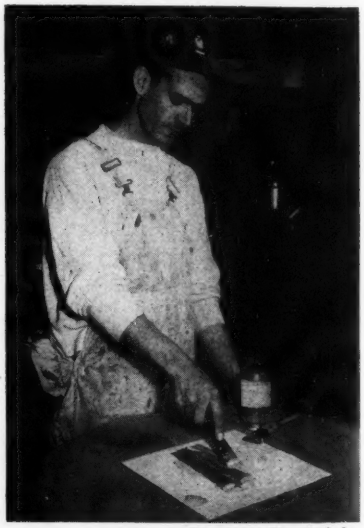
Formulations are not limited to caustic soda, but other alkaline materials such as trisodium phosphate, sodium metasilicate, and caustic potash can be used. Plain sawdust or an inert material like whiting also makes a good cheap thickening agent. For the most part, such materials are not packaged and sold as paint removers, but are made up at the point of use. However, mixtures of powdered caustic and inert filler can be marketed in air-tight containers with label instructions on the amount of water to be added for a particular use.

BLACK-OUT PAINT

At the end of the war, some industrial plants had the problem of removing black-out paint. That was not so true in this country as in Europe. Such a paint resembled camouflage in that it was highly pigmented and contained very little oil. In some cases scraping could be

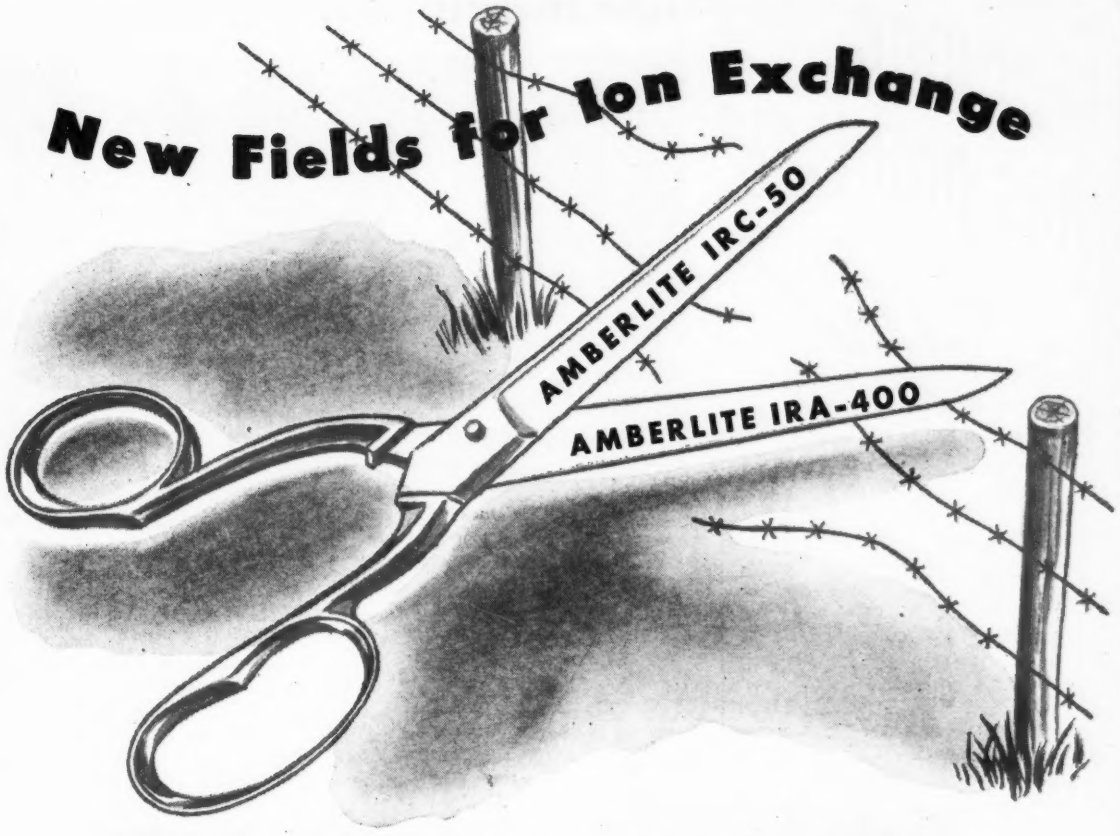


Scrape-off (top) and flush-off methylene chloride type strippers attack resin enamel.



The Dow Chemical Co.

Finish is easily removed after scrape-off stripper has loosened Bakelite-type enamel.



With The New Amberlites

IRC-50—Here's AMBERLITE IRC-50, a carboxylic-acid exchanger that selects cations with a precision impossible with strong-acid adsorbents, an extremely high capacity exchanger that owes its exchange selectivity—and its broad use—to the weakly-acidic activity of its exchange groups.

It's a resin whose great avidity for hydrogen ions permits regeneration with only theoretical quantities of dilute acid, a resin that can actually be buffered to maintain any desired pH level in the effluent. This exchanger has opened new fields of concentration, isolation, and purification of antibiotics, basic amino acids, alkaloids, milk products, and other hard-to-treat materials.

Capacity? Extremely high. In alkaline media the resin will actually adsorb its own weight of quinine sulfate!

IRA-400—And here's an anion exchanger. AMBERLITE IRA-400, so strongly basic that it behaves like solid caustic with only its hydroxyl ions in solution, so basic that it will adsorb phenol, naphthenic acid, carbon dioxide, hydrogen sulfide, and silica . . . phosphates, borates, and cyanides . . . amino acids and fatty acids . . . and countless other anions that once defied effective adsorption by weak-base exchangers.

Even new operational techniques are now open to ion exchange: You can now reverse the order of deionization if the medium which you wish to treat cannot withstand a reduction in pH. Or, if no change at all in the pH of the medium is permissible, you can actually mix AMBERLITE IRA-400 with a strong-acid cation exchanger like AMBERLITE IR-120 and deionize in one container and in one operation!

Write today for technical notes on the AMBERLITES IRC-50 and IRA-400.

AMBERLITE *is a trade-mark, Reg. U. S. Pat. Off.*

CHEMICALS FOR INDUSTRY

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Washington Square, Philadelphia 5, Pa.

The Resinous Products Division was formerly The Resinous Products & Chemical Company

PAINT REMOVERS (Continued)

Du Pont Co.

Household furniture is easily refinished with the aid of a paint remover.

employed to take it off, but in others scrubbing with an aqueous detergent solution was necessary.

The Paint Research Station in England in its published directions for removal of black-out paint recommended that glue be heated and brushed onto the paint surface. On drying, the glue film contracts and tends to peel off, taking the paint with it. This is not instantaneous, but may require a period of several hours.

SOLVENT PAINT REMOVERS

Solvent paint removers are the most popular types. The desired properties are (1) rapidity of action, (2) low volatility, (3) proper viscosity, (4) non-toxicity, (5) low flammability (some types), (6) clean rinsability, (7) non-corrosiveness and (8) stability during storage. No one product can be said to be ideal in meeting all of these requirements although several products have been patented which aim at the ideal.

Earlier formulations which can still be used successfully on many finishes were based mainly on a simple mixture of solvents with a small amount of paraffin to cut down on volatility. The wax is melted and then diluted with a mixture of benzene and acetone. Upon stirring in industrial alcohol, the wax is dispersed throughout the mixture in a very fine suspension.

A typical formulation would be:

Acetone	43 gal.
Benzene	38 gal.
Paraffin	90 lbs.
Ethanol	38 gal.

Modern paint removers usually contain a number of ingredients to give an all-around product which will meet as many of the preceding objectives as possible. For example, a product may contain one or more volatile solvents which will have a dissolving effect on the paint film; a chlorinated solvent to reduce flammability; a wax to reduce volatility; a dispersing agent to blend in the wax; and a surface-active agent to promote penetration and free rinsability.

Among the volatile solvents, two or three of which may be present, are benzene, toluene, ethyl methyl ketone, acetone, and ethyl acetate. Methanol, ethanol, or some other low molecular-weight alcohol is often incorporated into the mixture, though usually as a solvent for the thickener. Of the chlorinated hydrocarbons, methylene chloride, ethylene chloride, perchlorethylene and sometimes carbon tetrachloride, may be used. Chlorinated hydrocarbons differ among themselves in speed of action as shown by the following table[1].

EFFICIENCY OF CHLORINATED HYDROCARBONS IN STANDARD PAINT REMOVERS

Chlorinated Hydrocarbon	*Time to Remove Finish in Minutes*
Methylene chloride	4.5
Ethylene dichloride	9.4
Trichlorethylene	12.4
Monochlorbenzene	12.5
Carbon tetrachloride	18.8
o-Dichlorbenzene	20.4
Propylene dichloride	29.1
1,2,4,-Trichlorobenzene	46.2

Although the table shows methylene chloride to be the fastest acting as a paint stripper, the investigators who did this research found that the stripping time could be greatly improved by addition of enough water to saturate the methylene chloride, and even further by adding a little acetic acid. For example, addition of water alone reduced the time required to strip a finish from 180 minutes to 8 minutes in one case;

[1] L. E. Kuentzel and A. W. Liger, The Iron Age *160*, No. 15, 78-83 (1947).

PAINT REMOVERS (Continued)

addition of acetic acid reduced stripping time from 8 minutes to 1⅛ minutes. The 8 minute stripping time was obtained with 0.15 per cent of water as the activator; the 1⅛ minute stripping time, by addition of 0.2 per cent acetic acid.

It is preferable to avoid use of a mixture of highly halogenated hydrocarbons by themselves as paint remover because of the toxicity of these compounds[2]. Both Federal and Navy Department Specifications for solvent paint removers ban the use of carbon tetrachloride.

Benzene, too, is objectionable from the standpoint of toxicity—it is more toxic than some halogenated hydrocarbons—and has the added hazard of flammability. For these reasons, the Navy also prohibits benzene type strippers.

The wax used is very frequently plain white paraffin, although it may be nitrated paraffin or halogenated paraffin. Nitrated or halogenated scale wax has also been used. The amount is usually 1-3 per cent.

Although wax in simpler formulations functions as both thickening agent and evaporation inhibitor, it is now generally used only for the latter purpose. Upon application to the painted surface, the wax crystallizes out on the top of the mixture, forming a continuous film that locks in the solvents. Moreover, when the paint film becomes soft, the wax, itself a soft film-former, keeps the film in that condition by preventing further oxidation.

After the stripper has done its work, and the blistered paint has been scraped off, all the residual wax must be removed from the surface prior to repainting. A thin film can affect the adhesion of the finish and slow its drying. This is particularly important in metal refinishing shops. For this reason, it is best to keep the content as low as good performance will permit. To insure complete removal of wax film, the surface should be sponged with a solvent such as benzene after scraping.

This objectionable residue left when large amounts of wax were used to thicken mixtures was responsible for the introduction of other thickening agents. Starch, wood flour, other powdered materials, cellulose nitrate and cellulose acetate are still used, as well as the newer cellulose derivatives like methyl cellulose. In addition to providing the desired viscosity for a particular application, these materials also serve as protective colloids to prevent crystallization of wax from solution during storage. Too much should not be present, however, since it tends to reduce the stripping power of the solvents.

Amines promote wetting power and penetration of the paint film. Other wetting agents include petroleum sulfonate and ethylene glycol monobutyl ether. These not only give greater surface penetration, but aid in emulsifying the wax so that stable products can be produced. Moreover their surface-active properties make rinsing residual remover much easier and more complete.

[2] A. R. Smith, Ind. Bull. (N. Y. State Dept. Labor) *20*, 142-3 (1941).

SCRAPE OR FLUSH

Whether the loosened paint film is to be removed by scraping or by flushing with water will depend upon the article being refinished. In general, small-packaged paint removers will be used on veneered furniture and other fine household articles in addition to metal. Since water can cause objectionable grain raising in the wood, a stripper designed for the scrape-off operation is most suitable here. For removing paint from metal objects or from wood where grain raising is not a problem (house exteriors, for example), a flush-off type offers the time-saving advantage of cleaning the surface with a stream of water.

A fairly simple formulation of the scrape-off type that has been suggested by a major supplier of solvents is the following:

Methylene chloride	90 gal.
Methanol	10 gal.
Methocel*, 4000 cps.	11.0 lbs.
Paraffin	16.5 lbs.

The methyl cellulose, which acts as a thickening agent, is thoroughly wet with methylene chloride and then dissolved in the methanol. This is followed by the balance of the methylene chloride, and then the wax, preferably melted, is added to this solution. Such a product when brushed on a surface will loosen the paint film in a few minutes, depending upon the thickness and number of coats.

Another formulation suggested as a flush-off type has the following general composition:

Methylene chloride	71 gal.
Carbon tetrachloride**	6 gal.
Methanol	12 gal.
Monisopropanolamine	4 gal.
Monoethylamine (70% solu.)	4.5 gal.
Water	2.5 gal.
Methocel*, 1500 cps.	22 lbs.
Areskap 100†	33 lbs.
Potassium oleate	22 lbs.
Paraffin	16.5 lbs.

Both the methyl cellulose and the wax perform their usual functions in this formulation, with the carbon tetrachloride added to aid the solubility of the wax in the presence of the water. The amine mixture is an activator for the methylene

* The Dow Chemical Co. trade name for methyl cellulose.

** Can be replaced with equal volume of ethylene dichloride.

† Monsanto Chemical Co. trade name for monobutylphenylphenol sodium monosulfonate.

Zinc Chloride

FOR USE IN—Preserving wood; Finishing paper and textiles; Flameproofing and dyeing textiles; Galvanizing; Manufacturing vulcanized fibre, batteries and glue.

Zinc Sulphate

FOR USE IN—Fertilizers and orchard sprays; dyeing and printing textiles; Electro plating; Electro galvanizing; making rayon, paint, varnish, glue.

At Wheatland, Pa., Maneely Chemical Company has one of the most efficient, modernly equipped chemical plants in the country.

Glass lined vats and equipment and a new process combine to give a new high in uniformity, purity and quality.

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PAINT REMOVERS

(Continued)

chloride, while the surface active ingredients, which are dissolved in the water, emulsify the solvents and help the flushing-off process. This product is suitable for use on all finishes but nitrocellulose lacquers.

Among the newer patented products are slow-drying emulsions such as the following[3]:

Material	*Parts by Volume*
Nitropropane	15
Normal methyl amyl ketone	15
Oleic acid	10
Triethanolamine	4.3
Pine oil	2

The triethanolamine and oleic acid form a soap that blends with the solvents as the mutually soluble materials are mixed together. Pine oil takes over the traditional role of wax in slowing down evaporation, and at the same time imparts an odor that is more pleasing than the solvent odor to most people. The resultant product is a homogeneous gel that can be used as a paste on vertical surfaces, or dispersed in water if desired. After application, it can be rinsed away with water or volatile oils, as the emulsion is soluble in either one.

OUTLOOK

War-time demand for efficient paint strippers for use on ships, planes and vehicles has, of course, abated, but with a continued high military budget, the government will still require large quantities. Private industry's needs for the same purposes are considerable, and the return to normal peace-time maintenance programs represents a larger market throughout the industrial scene. With more people doing their own odd jobs, small-packaged paint removers should find wider acceptance for use on small boats, cars, furniture and houses.

Equipment for manufacture is relatively simple, with mixing tanks the main requirement. In the case of some of the newer emulsion types, facilities for homogenizing the product are useful. Packaging presents no great problem, with tin or galvanized containers or steel drums being satisfactory in most cases. Use of some of the amines, however, may result in somewhat corrosive products for which glass or terne plate containers are advisable if long storage is expected.

Although formulation trends of the past few years have yielded better strippers, the many types of protective coatings rule out the possibility of a universal paint remover. Undoubtedly newer coatings will present tougher problems, but application of the chemical principles outlined above should lead to more efficient, yet non-corrosive strippers.

[3] John D. Morgan and Russell E. Lowe, U.S. Patent 2,393,798, January 29, 1946.

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Gold Bond Flexfelt Blankets and Pipe Coverings. *Effective up to 1250° F.* Made from fireproof mineral wool, felted and reinforced on both sides by metal fabrics bound together by tie-wires. Carefully packed and easy to handle. Both blankets and pipe coverings are produced by the most modern methods of blowing, resulting in longer, tougher fibres. Greater thermal efficiency, greater chemical stability, greater resistance to moisture absorption and vibration. Write for a free sample.

Gold Bond No. 340 Insulating Cement. *Effective up to 1800 °F.* Offers four advantages! (1) Superior adhesive qualities, (2) greater coverage, (3) no shrinkage cracks, (4) greater thermal efficiency.

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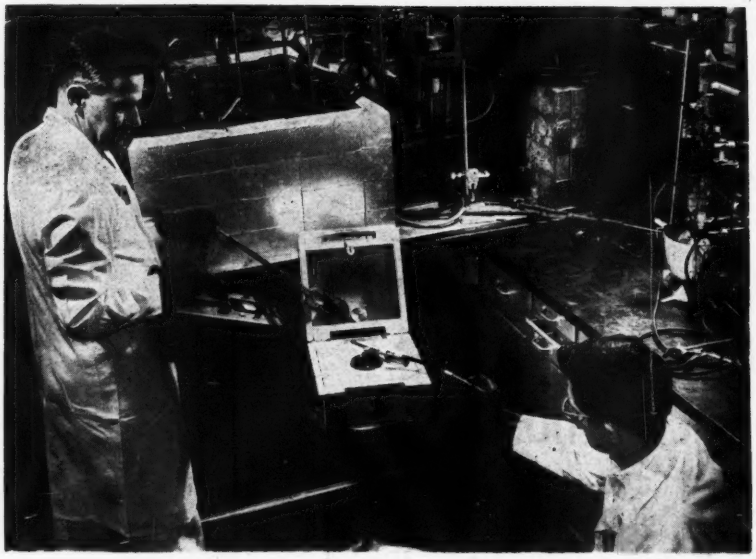


Dr. D. L. Tabern (left), in charge of the Special Research Department of Abbott Laboratories, checks a vial of radioactive compound with a survey meter as Dr. Richard U. Schock places it in the lead pot for shipping.

Radio-Compounds NP 851

Abbott Laboratories producing isotope-labeled pharmaceuticals for research.

Abbott Laboratories is currently producing radioactive pharmaceuticals and distributing them below cost to numerous research and medical institutions.

Those pharmaceuticals are iodine 131-labeled diiodofluorescein, gold 198 in collodial gold, gold 198-labeled gold sodium thiosulfate, sulfur 35-labeled thiourea, iodine 131 solution (sodium iodide), phosphorus 32 solution (sodium phosphate), and Pentothal containing S-35.

These materials are standardized according to radioactivity and are prepared in forms suitable for direct administration or for pharmacologic experimentation. Others will be added from time to time. All materials are distributed from the Special Research Department of Abbott Laboratories.

Abbott is also prepared to cooperate with qualified research groups in the synthesis and development of other radioactive materials which such groups may wish to use.

The use of isotopic, or radioactive, materials is restricted by the Atomic Energy Commission to qualified research groups which have demonstrated their knowledge of the field, have laboratories for safe work, and have received the approval of the commission. Several hundred such groups are now operating in the United States and are eligible for the materials produced by Abbott.

No specific prices have been set on the items, but they are being supplied as a contribution to research at substantial reductions below the actual cost of production.

Colored Nylon NP 852

Nylon molding powder in a range of 13 colors is now available.

Nylon molding powder is now available in colors from the Plastics Department of the Du Pont Co.

Commercial production of nylon in a standard range of thirteen colors—buff, gray, light green, dark green, two light blues, peach, red, pink, orange, yellow, ivory and white—is now under way.

Four other colors are in the last stages of development and will be on sale in the near future. They are a dark blue, a deep green, a black, and a brown.

The colors are incorporated directly into the material and are permanent. They are not affected by molding temperatures.

All of the colored forms are of the general-purpose type of nylon designated by Du Pont as FM 10,001. This plastic offers unusual toughness and resistance to heat—in some cases as high as 380° Fahrenheit—and is the type of molding powder most generally in use.

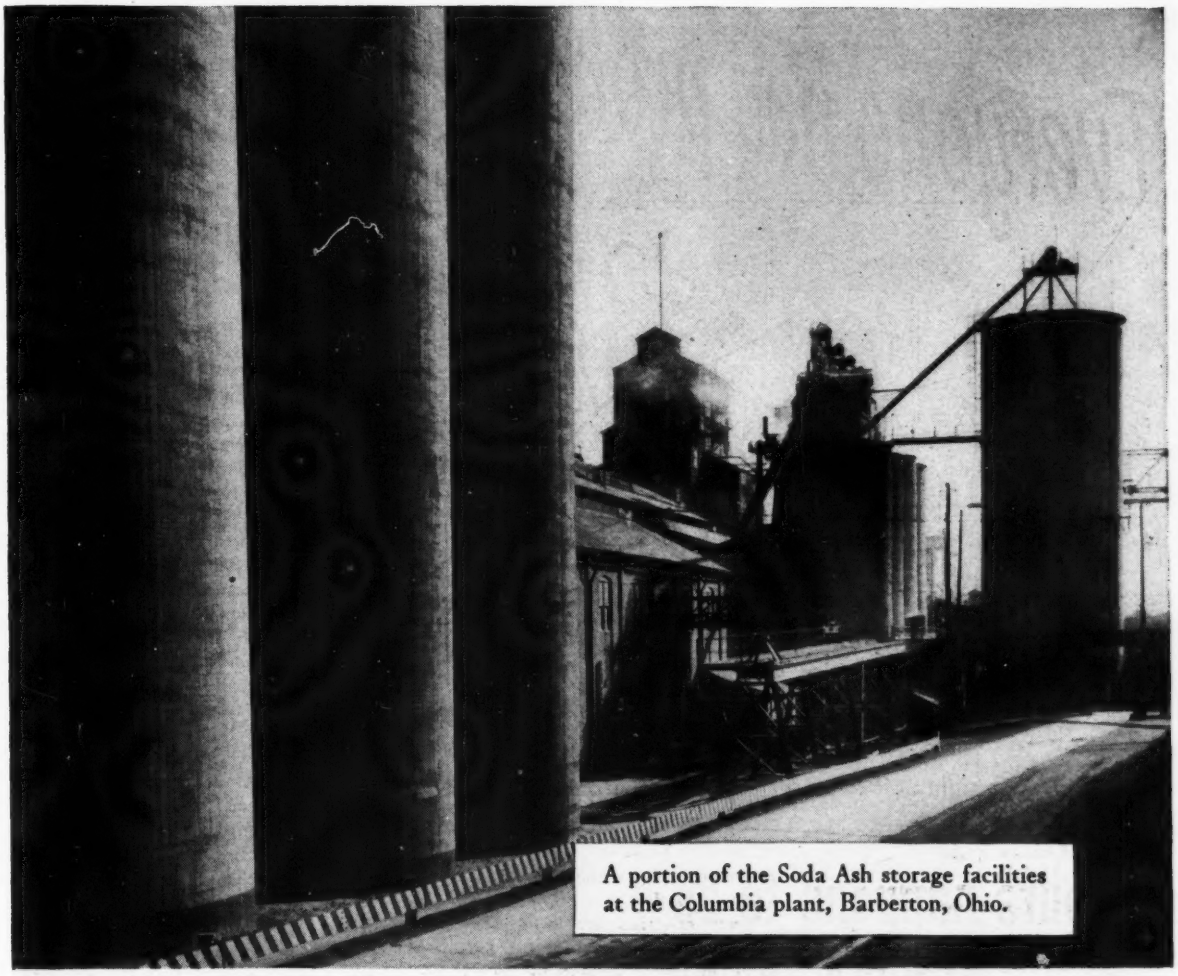
The colored forms of FM 10,001 have all the properties of the plastic in its natural color. Service temperatures, greatly exceeding those of other thermoplastics, permit sterilization of colored nylon by steam. And since FM 10,001 molding powder has marked fluidity at molding temperatures, the colored forms are particularly well adapted to the molding of articles in thin sections and to flowing around complicated inserts.

3-Butyn-1-ol NP 853

Semi-commercially produced acetylenic alcohol of interest in synthesis.

Farchan Research Laboratories is in semi-commercial production of an acetylenic alcohol, 3-butyn-i-ol (beta ethynyl ethanol).

This compound, containing both an acetylenic structure and a alcohol group, should be of interest to the pharmaceutical, aromatics, plastics and dye industries. The compound itself, as well as its



A portion of the Soda Ash storage facilities at the Columbia plant, Barberton, Ohio.

Here's why it pays you to use Columbia Soda Ash — Light or Dense

Made for Your Requirements—Columbia's original product; manufactured, since 1899, with intimate knowledge of the specific needs of all types of industrial applications.

Controlled Quality—Eliminates variables which can cause production difficulties. Highest standards maintained to produce Soda Ash which always tests 99-100% Na_2CO_3, with an Na_2O equivalent of 58% plus.

Precise Grading—Density, for the grade specified, is uniform in particle size. Your production methods require no adjustments for Columbia Soda Ash.

Check your Soda Ash requirements with Columbia . . . you'll receive excellent service—another important factor in your operations.

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PITTSBURGH PLATE GLASS COMPANY

derivatives, should prove to be a potentially valuable intermediate in the preparation of essential oils, in the treatment of textiles, and in the manufacture of drugs and general organic synthesis.

The product is a colorless liquid with a characteristic odor. It has a molecular weight of 70.09, a boiling point of 128.9° C., a freezing point of —63.6° C., a density of 0.9257 at 20/4, and an index of refraction at 20° of 1.4409.

Detergent NP 854

Liquid detergent added to dry formulations prevents dusting.

A light-amber liquid synthetic detergent, for preventing dusting of powdered and dry detergent mixes, is being offered by Monsanto Chemical Co.

The product, 100% active and non-ionic, is sold under the trademark Sterox CD. It is claimed that Sterox CD synthetic detergent will eliminate dusting at no extra cost because it can replace an equivalent amount of other surface-active agents normally used.

An effective detergent in its own right, Sterox CD actually adds to the efficiency of the finished mix.

Addition of 1-2% of Sterox CD to dry mixtures will reduce dusting during the mixing operation and in the finished product. It can be atomized into dry powder, or introduced as a pilot-mix with the other ingredients. It may also be used in mechanical dish washing compounds because of its low sudsing tendencies and excellent detergency.

Fluorine Compound NP 855

Bis(trifluoromethyl) benzene is latest of Hooker's fluorinated intermediates.

Pilot plant production of bis(trifluoromethyl)benzene (xylene hexafluoride) is under way at Hooker Electrochemical Co. The product is a mixture of the para and meta isomers. It has a specific gravity at 20°C of 1.395, a freezing range of —40° to —50°C, a distillation range of 113° to 117°C, and a flash point of 37°C.

Among the possible uses suggested by its chemical and physical properties: intermediate in the preparation of non-flammable dielectric and hydraulic fluids and starting material for the preparation of dyestuffs.

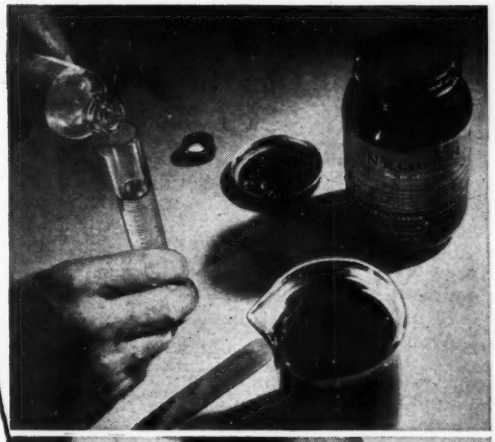
Gallium NP 856

Availability of this strange metal may spur search for uses.

Gallium, a rare, silvery-white metal of unique properties, is now being produced and sold by Aluminum Company of America.

This unusual metal is liquid on a warm summer day (melting point, 86°F), but it will not boil until heated to approximately 3700°F. Gallium shows a strong tendency to undercool, and the liquid

How to cement a "Karbate" threaded pipe joint



1. Thoroughly mix "National" cement with "National" accelerator in recommended proportions.

2. Pour part of the mixture onto a table and work it carefully into the threads of the collar...

3. Then work mixture into pipe threads...

4. Screw collar firmly in place and wipe off excess cement with acetone... the resulting joint is as strong and impervious as the pipe itself!

KEEP "KARBATE" PIPE ALWAYS IN STOCK!

- Resists the action of acids, alkalies and other chemicals
- Light weight with adequate strength
- Resistant to mechanical shock
- Immune to thermal shock
- Easy to machine and install
- Full range of sizes and fittings

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metal may be held for some time at temperatures almost as low as the freezing point of water without solidification taking place.

Though similar to aluminum in its chemical behavior, gallium is not a light metal. Its density (5.9) is about twice that of aluminum, but only about half that of metallic mercury, which is also a liquid at room temperatures. Like water, but unlike most elements, the density of gallium is greater as a liquid than as a solid; gallium actually expands on solidifying.

Gallium wets many types of non-metallic surfaces, such as glass and porcelain. As in the case of aluminum, a protective natural oxide film forms readily on the surface. Even when heated to temperatures as high as 1000°F, a globule of gallium will remain bright and shiny. This combination of properties should make possible a variety of unusual applications for gallium.

Chemists of Alcoa's Aluminum Research Laboratories have found a practical way of separating and concentrating the gallium oxide occurring in bauxite. From the oxide, metallic gallium of high purity is being produced. As a result of these accomplishments, Aluminum Company of America is now able to offer metallic gallium in limited quantities.

Acrylic Resin NP 857

Higher-temperature molding and greater fluidity mark new acrylic molding powder.

Commercial production of a new heat-resistant acrylic molding powder has been announced by Du Pont.

The newest acrylic resin can be molded successfully at temperatures about 50° F. higher than were practical with the heat-resistant material it replaces. The new powder is designated "Lucite" HM-140 as distinguished from HM-122, its predecessor.

Available in crystal and a wide range of colors, the new composition will be competitive in price with general-purpose acrylic molding powders.

Increased heat stability and improved flow properties give HM-140 a considerably broader molding range than that of HM-122. The new composition can be injection molded at cylinder temperatures of 360° to 490° Fahrenheit. This will enable molders to obtain the heat resistance in finished articles of HM-122, with the moldability of general-purpose acrylics.

The fact that the new powder can be successfully molded at higher temperatures than were practical with HM-122 will be a marked advantage in molding thin or intricate sections where fluidity must be greater.

In addition, "Lucite" HM-140 is more fluid at a given molding temperature than HM-122 was. It can be molded into thick sections at lower temperatures and there-

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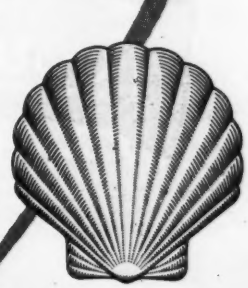
	C_{12}-C_{20}plus	C_{12}-C_{14}	C_{15}-C_{17}	C_{18}-C_{20}plus
Specific Grav. 20/4°C	0.774	0.760	0.773	0.778 @ 35/4°C
Color, Saybolt	Water-white	Water-white	Water-white	Water-white
Melting Range, °F	40-55	15-25	45-55	80-90
Bromine No.	0.1	0.1	0.2	0.1
Dist.: IBP	450	428	496	576
FBP	657	491	553	692
n-Paraffins, vol. %	95 plus	95 plus	95 plus	95 plus

● Normal paraffins ranging from C_9 to C_{23} are now offered by Shell Chemical for your evaluation. These products vary in physical state from water-white liquids to low-melting point solids, and are essentially free of unsaturated hydrocarbons.

Sample quantities are now available in the ranges of C_{12} to C_{20}, C_{12} to C_{14}, C_{15} to C_{17}, and C_{18} to C_{20}.

These normal paraffins are suggested as intermediates for the manufacture of detergents, plasticizers, halogenated hydrocarbons, and other products. *A letterhead request will bring samples and further technical information.*

● Among the many products marketed by Shell Chemical are Acrolein, Methyl Ethyl Ketone and Secondary Butyl Alcohol.



SHELL CHEMICAL CORPORATION

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Los Angeles · Houston · St. Louis · Chicago · Cleveland · Boston · Detroit · Newark

fore cools and hardens more rapidly than the old type. This results in a shorter molding cycle with less shrinkage of the molded piece.

Secondary Fatty Amines NP 858

Secondary fatty amines higher boiling than primary, salts are oil-soluble.

Two new amines of interest to industrial chemists have been added to the Armeen line by Armour & Co. These new Armeens, 2C and 2HT, are secondary fatty amines in which the alkyl groups are of the following average compositions:

Alkyl Radicals (No. of C atoms)	*Percentage* *Armeen 2C*	*Armeen 2HT*
8	8	—
10	9	—
12	47	—
14	18	—
16	8	25
18	10	75

The secondary amines are higher boiling than the corresponding primary amines. They are light in color and melt at 46° C. (2C) and 68° C. (2HT). Salts are insoluble in water but soluble in organic—even non-polar—solvents.

Their use is suggested in lubricant additives, rust inhibitors, rubber chemicals, textile treating agents, oil-soluble quaternaries, and synthetic waxes.

Detergent NP 859

Low cost and high effectiveness is claimed for a liquid alkyl aryl sulfonate.

Sulframin E Liquid is a modified alkyl aryl liquid, the latest development of Ultra Chemical Works, Inc. Exceptional hard-water and lime-soap stability as well as excellent foaming, wetting, and detergent qualities are claimed. It is very stable and said to be more effective in the presence of acids and alkalis than other alkyl aryl sulfonates.

Sulframin E, prepared as a clear amber-colored liquid, is available in drums, tankwagons, and tankcars. In its liquid form it is represented to be the most economical value obtainable in the synthetic detergent field, based on cost per active percentage.

Phenolics NP 860

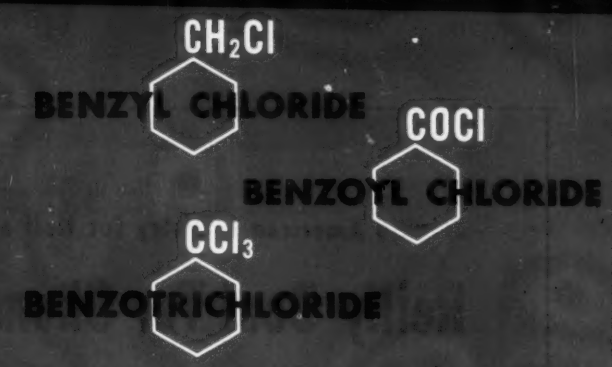
Wood flour-filled phenolic molding powders offer lower costs.

A new group of general-purpose phenolic molding powders has been developed by General Electric Co.'s Chemical Department. These new wood flour-filled materials are priced an average one cent per pound below the market price of other general-purpose molding powders.

The four compounds—black and brown for compression and transfer molding—have a specific gravity of 1.37, and are said to have flow characteristics, cure time, and water resistance nearly equal to more costly wood flour-filled phenolics.

Although the new materials do not have a high gloss on long-draw moldings and may show a slightly less rigid dis-

HEYDEN CHLORINATED AROMATICS



PUT THE PLUS IN YOUR PROCESS...

As solvents and intermediates in the manufacture of pharmaceuticals, dyes, fungicides and organic chemicals, Heyden Chlorinated Aromatics are valuable to many processes and products. The following chart indicates the extensive range they cover.

CHLORINATED Benzaldehydes	CHLORINATED Benzyl Chlorides	CHLORINATED Benzoyl Chlorides	CHLORINATED Benzotrichlorides	CHLORINATED Toluenes	CHLORINATED Benzoic Acids
Ortho Chlor Benzaldehyde Assay: 98.0% Containers: Glass carboys	**Ortho Chlor Benzyl Chloride** Assay: 98.0% Containers: Glass carboys	**Ortho Chlor Benzoyl Chloride** Assay: 95.0% Containers: Glass carboys	**Ortho Chlor Benzotrichloride** Assay: 98.0% Containers: Glass carboys	**Ortho Chlor Toluene** Assay: 99.0% Containers: Glass carboys or iron drums	**Ortho Chlor Benzoic Acid, Technical** Assay: 97.0% Containers: Wooden barrels
Para Chlor Benzaldehyde Assay: 98.0% Containers: Fiber drums	**Para Chlor Benzyl Chloride** Assay: 97.0% Containers: Glass carboys	**Para Chlor Benzoyl Chloride** Assay: 98.0% Containers: Glass carboys	**Para Chlor Benzotrichloride** Assay: 98.0% Containers: Glass carboys	**Para Chlor Toluene** Assay: 97.0% Containers: Glass carboys or iron drums	**Para Chlor Benzoic Acid, Technical** Assay: 97.0% Containers: Wooden barrels
2,4-Dichlor Benzaldehyde Assay: 97.0% Containers: Fiber drums	**2,4-Dichlor Benzyl Chloride** Assay: 97.0% Containers: Glass carboys	**2,4-Dichlor Benzoyl Chloride** Assay: 98.0% Containers: Glass carboys	**2,4-Dichlor Benzotrichloride** Assay: 98.0% Containers: Fiber drums	**2,4-Dichlor Toluene** Assay: 99.0% Containers: Glass carboys or iron drums	**2,4-Dichlor Benzoic Acid, Technical** Assay: 97.0% Containers: Wooden barrels
3,4-Dichlor Benzaldehyde Assay: 96.0% Containers: Fiber drums	**3,4-Dichlor Benzyl Chloride** Assay: 96.0% Containers: Glass carboys	**3,4-Dichlor Benzoyl Chloride** Assay: 95.0% Containers: Glass carboys	**3,4-Dichlor Benzotrichloride** Assay: 96.0% Containers: Glass carboys	**3,4-Dichlor Toluene** Assay: 97.0% Containers: Glass carboys or iron drums	**3,4-Dichlor Benzoic Acid, Technical** Assay: 97.0% Containers: Wooden barrels

Technical literature and samples will be mailed promptly upon request on Company letterhead.

Serving Industry Through Finer Chemicals

Benzaldehyde • Benzoates • Benzoic Acid • Benzyl Chloride • Bromides
Chlorinated Aromatics • Chlorobenzenes • Creosotes • Formates • Formaldehyde
Formic Acid • Glycerophosphates • Guaiacols • Hexamethylenetetramine
M.D.A. (Methylene Disalicylic Acid) • Paraformaldehyde • Parahydroxybenzoates
Penicillin • Pentaerythritols • Salicylates • Salicylic Acid • Streptomycin

FINE HEYDEN CHEMICALS

HEYDEN CHEMICAL CORPORATION

393 SEVENTH AVE., NEW YORK 1, N. Y.
CHICAGO 6: 20 North Wacker Drive
PHILADELPHIA 3: 1700 Walnut Street
SAN FRANCISCO 11: 420 Market Street

charge from the mold, tests by General Electric indicate that they are highly satisfactory for the majority of thermosetting plastics applications.

Polyester Resin NP 861

Polyester-styrene blend characterized by high viscosity.

A new low-pressure resin with a viscosity of 50,000 to 65,000 centipoises is now available in commercial quantities for plastics laminating, molding or casting operations. Its suggested uses: to improve laminating work by a thicker surface coating; to decrease the flow of resin prior to gelation in molding; to improve control of pigment and filler suspension in casting operations; or to increase film thickness of dip coatings.

One of the Paraplex "P" series, the new resin has been designated as P-43HV, and is identical to Paraplex P-43 except that it is supplied at a polyester: styrene ratio of 80:20 instead of 70:30. Its high viscosity compares with that of 2,000 to 2,400 centipoises for the Paraplex P-43. Both grades use the same base polyester.

It is supplied by the Resinous Products Division of Rohm & Haas Co., as a nearly water-white liquid.

Carbon Black NP 862

High-abrasion furnace black claimed to be especially effective in cold rubber.

Godfrey L. Cabot, Inc., is now making on full scale Vulcan 3, a new high abrasion furnace black, the latest and most reinforcing of the Cabot furnace blacks. It is now available in commercial quantities. Production facilities are located at the Ville Platte, La., plant of the Cabot company.

Vulcan 3 has outstanding abrasion resistance, reinforcing and processing properties in all types of rubber, but is especially effective in the new type cold rubber. Laboratory tests are now being confirmed by extensive factory and road-wear tests which have been in progress for many months.

Filtering Clay NP 863

Granular, high-efficiency fullers earth said to reduce refinery costs.

Attapulgus Clay Co. is now offering a new granular, high-efficiency fullers earth for percolation filter-house use. Refining efficiency of the new clay—designated as "Attapulgus AAA Grade Clay"—has been established in extensive tests and commercially proved by use in a large oil refinery.

Claimed for "AAA" is its ability to reduce clay costs since, with most oils, it displays 10% to 20% more refining efficiency and maintains this increase over its life. It thereby becomes practical to reuse it through more cycles; thus clay

A page from the Stauffer Catalog

NUMBER FOUR IN A SERIES

Crystex Insoluble Sulphur . . .

CRYSTEX Insoluble Sulphur is widely used with natural rubber and synthetic elastomers. Like ordinary sulphur it is the vulcanizing agent. Unlike the regular soluble sulphur, CRYSTEX has the special property of not blooming on uncured stocks. CRYSTEX replaces ordinary rubbermakers sulphur in tire carcass stocks, white sidewalls, valve-patch frictions, re-treads and other repairs stocks. There is a place for it in shoe soles. The stability of the sulphur dispersion in a naphtha cement is improved when CRYSTEX is employed. Cord-dipping dispersions are made better with CRYSTEX in the place of ordinary sulphur. CRYSTEX is 99.5% sulphur and not less than 85% of it is rubber-insoluble at the usual milling temperatures. It is very finely divided to provide the desired distribution of the sulphur in the milled stock. Insoluble sulphur is a metastable form; that is, the conversion to the stable soluble form occurs at the usual vulcanizing temperatures. Compared with regular-sulphur stocks, those compounded with CRYSTEX may give slightly faster or somewhat "tighter" cures.

CRYSTEX Insoluble Sulphur, 99.5% pure (85% insoluble sulphur content) offers flexibility. Use straight for maximum control of sulphur-blooming. Blend with regular sulphur, or with Flowers of Sulphur (which normally tests 30% insoluble sulphur), to any lower "I. S." content a particular stock can get along with.

In line with the Stauffer Chemical Company's established policy, a continuing extension of the useful applications for this interesting product in rubber technology will enable Stauffer to offer CRYSTEX at lower cost. A description of particular problems will enable Stauffer to consult on the possible use of CRYSTEX Insoluble Sulphur in a given product.

A circular containing recent data and research information about CRYSTEX is available. This circular details various applications of CRYSTEX—tire carcass stock, white sidewalls, tube stocks, re-tread and other repairs stocks, mechanicals, naphtha cements, latex dispersions, reclaim stocks and bin stocks.

Packages: Paper bags (multiwall)—50 lbs. net.

USES: In all stocks which normally suffer from "bloom" in the uncured state including repair stock such as retreads and recaps, and tire carcass stocks which lose "tack" in temporary storage; also in some critical mechanical goods stocks. CRYSTEX has also replaced ordinary sulphur in some latex compounds and naphtha cements.

costs are cut 15% to 25%. In addition, states the company, substantial operating credits accrue from the higher yields per ton for "AAA".

"AAA Grade Clay" is now available in standard percolation meshes—in bags or bulk.

Lipids NP 864

A purified lipids fraction is made available for biochemical research.

BSC Lipids, an extract of beef spinal cord after the removal of cholesterol, contains spingomyelins, other phosphatides, and cerebrosides. A yellow, waxy solid with m.p. below 100° C., it may be characterized as follows:

Content of	%
N	2.3
P	2.3
Cholesterol	<0.1
Choline	>2.9
Reducing Sugar	>2.3

BSC Lipids has been suggested as a superior emulsifier with special properties, as an inhibitor of thromboplastin, i.e., antithromboplastin, as a desirable anticoagulant, and in other ways. Pilot plant quantities of BSC Lipids are available from Armour and Co. for experimental use. The present price is $1.75 per pound, net f.o.b. Chicago.

Polish Base NP 865

Newly-developed polish base is particularly designed for furniture polishes.

E. F. Drew & Co., Inc., has developed Napthole Polish Base N, an emulsifying agent for mineral oil. Primarily designed for the production of liquid cream furniture polishes, Napthole Polish Base N is of interest in other applications where mineral oil emulsions of good stability and detergent action are desired.

Phthalates NP 866

American Cyanamid undertakes quantity manufacture of octyl phthalate plasticizers.

American Cyanamid Co. has recently added to its line of organic chemicals di-2-ethylhexyl phthalate and di-iso-octyl phthalate, which will be marketed under the trade names Aero DOP and Aero DOPI. These plasticizers, now in quantity production at the company's Bridgeville, Pa., plant, are well suited for compounding vinyl resins into films.

Nickel Stripper NP 867

New alkaline material removes metal coatings, does not attack base steel.

Enthone, Inc., has developed a material called "Enthone Metal Stripper" for chemically dissolving nickel and other metal coatings from steel without attacking the steel. The stripper is alkaline in nature, can be contained in a steel tank, and requires no electric current. The

Technical GLYCERINE NEWS

NEW-TYPE RESIN. Description: pale, semi-solid made by interaction of glycerine with rosin fraction of tall oil. Properties: tacky, stable, unaffected by humidity changes, has solubilizing action on many materials. Uses: has potential applications in protective coatings, soap, adhesives, and synthetic rubbers. (R-1)

★ ★ ★

NEW METHOD DETERMINES GLYCERINE COLOR. A faster, more accurate method has been developed in the research laboratories of the Glycerine Producers' Association. The method, which utilizes the spectro-photometer, corrects defects of the old visual Lovibond method. (R-2)

★ ★ ★

APPROVED FIRE-RESISTANT DECORATIVE FINISH. Alkyd resins form the base for a new finish for interior decoration approved recently by the Bureau of Standards of Appeals of New York City. The coating is formed by spraying specially prepared fibers onto a surface treated with a fire-resistant adhesive. (R-3)

★ ★ ★

NEW CORK SUBSTITUTE. Glycerine is employed as a plasticizer to produce flexibility in a new cork substitute patented recently. The compound is claimed to have bulk density and resilience comparable to natural cork. (R-4)

★ ★ ★

ANTI-STICK COATING. Major problem in the use of bitumen-coated steel sheets in building trades is the adhesion of the tacky sheets to each other in storage. Answer to the problem may be a new anti-stick coating in which glycerine is an essential ingredient. (R-5)

GLYCERINE PRODUCERS' ASSOCIATION, DEPT. 3
295 MADISON AVENUE
NEW YORK 17, N. Y.

I should like to receive more information on the source of the items appearing in Technical Glycerine News. I have checked below those items which interest me.

☐ R-1 ☐ R-2 ☐ R-3 ☐ R-4 ☐ R-5

NAME .....

COMPANY .....

ADDRESS .....

parts to be stripped are merely immersed in a solution of Enthone Metal Stripper salts, in the temperature range from 16-180° F. Stripping speed varies from .0002" to over .001" per hour depending upon the concentration of salts and the operating temperature.

The process is stated to be ideal for removing of nickel plate from bulk work, such as barrel nickel-plated steel, which heretofore has been impossible or difficult to strip without attacking the base metal. The Enthone process does not etch or attack the base steel in any way. The steel is left in the same condition as it was prior to plating and, in most cases, the work needs merely to be dipped in acid and can be replated.

The stripper is also effective for removing copper plate from steel as well as silver, cadmium and zinc. The solution is not suitable for removing nickel coatings from zinc-base die castings or copper alloys.

Enthone Metal Stripper is covered by U. S. Patent No. 2,460,896 and further patents are pending.

Dioctyl Phthalate NP 868

Two new Carbide grades of dioctyl phthalate are substantially colorless.

Flexol plasticizer DOP is now available in two grades with greatly improved color, according to an announcement by Carbide and Carbon Chemicals Corp. New plasticizer facilities at Institute, W. Va., make it possible to produce substantially colorless DOP—of particular advantage for compounding clear transparent plastics.

The two new grades of DOP include one having a maximum A.P.H.A. color of 100 for non-electrical uses; the other, DOP-150, is for electrical uses and has a D.C. resistivity over 2×10^5 megohm/cm. and a power factor under 4 per cent, with a maximum A.P.H.A. color of 150.

Pelleted Sodium Pentachlorophenate NP 869

Monsanto introduces dust-free sodium pentachlorophenate pellets.

Relatively dustless, rapidly-dissolving pellets of sodium pentachlorophenate are being offered by Monsanto Chemical Company.

An industrial preservative and slime control agent, the chemical is sold under the trademark Santobrite. The pellets are said to have several advantages over the presently available forms of this material. The seed-like kernels are free-flowing and go into solution faster under static conditions because they do not paste.

The granular form was achieved by the addition of a non-adulterating agent. There is no decrease in assay over previous forms. Because of their higher apparent density the pellets may be more economically packed and shipped. They

have a high resistance to breakage in handling or transit.

The pellets are suggested for many applications, such as in cooling water systems, paper mills, for sap-stain control and paint and glue preservation.

Neutron Sources NP870

Improved neutron-emitting sources show greater and better emission, reproducible results.

The United States Radium Corp. is offering new and improved radium-beryllium neutron sources. New preparation principles and techniques have produced sources showing marked improvement in the neutron to gamma emission ratio, according to the company. New production techniques also have improved duplication of results, so that buyers can now obtain sources that do duplicate in neutron emission.

Sources can be provided in a powdered radium-beryllium mixture or a compressed radium-beryllium mixture, in any size, from a few milligrams content for routine experimentation, to 1,000 or more milligrams, for special applications. Packaged in stainless steel or magnetic iron capsules, all sources are made to order, and the design or shape of the container can be adjusted to meet special requirements.

Standard polonium-beryllium sources are also available, and special sources employing beta or gamma activated beryllium can be produced by arrangement.

Corrosion-resistant plastic paints designed for equipment maintenance.

Plastic Paints NP871

A line of corrosion-resistant plastic coatings developed especially for the chemical processing industry for general maintenance of processing equipment has been developed by Poly-Cyclo Products Co.

The coatings, termed CycLon series "NPC," are high-solids synthetic paints for protecting metals, wood and ceramic surfaces against chemical attack by corrosive fumes, condensates, spillage, etc. CycLon air-dries quickly by solvent evaporation to an adhesive coating without previous surface priming.

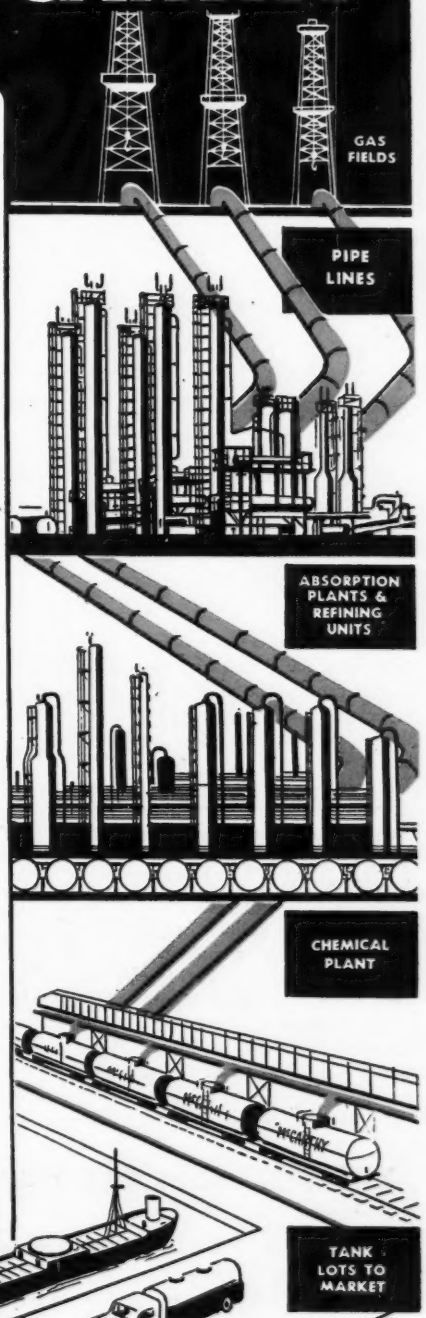
All "NPC" formulations have a coverage of 350 to 450 sq. ft. per gallon per coat when applied by brushing directly from the container.

CycLon coatings are unaffected by all alkalies, salts, and by most mineral acids. In addition, CycLon films are inert to alcohols, soaps, water, oxidants, food and fruit acids, oils, aliphatic hydrocarbons, gasoline (low octane) and many other corrosive reagents.

CycLon films of 0.002" thickness have a M-V-T rate of less than 2.0 per 100 sq. in. of area for 24 hours at 100% relative humidity.

(*Turn to page 474*)

FLOW CHART CALLED McCARTHY



THE McCARTHY INTERESTS now form a flow chart that is unique in the production of primary and intermediate chemicals for Industry's expanding needs and exacting requirements. For this flow chart begins and ends with McCarthy-owned and operated facilities and resources that provide unlimited reserves of natural gas, a supervised gathering system, and the controlled processing of hydrocarbons. All these add up to predictable volumes of petrochemicals and assured supplies for the chemical processing industry.

From well to market, this steady, uninterrupted flow of vital raw products for plastics, dyes, explosives and various other chemical applications is meeting today's demands efficiently, economically and promptly.

McCarthy Chemical Company operates a fleet of 10,000 gallon tank cars, specially lined to guard against contamination, specially insulated against temperature changes; the company also maintains storage, dock and loading facilities on deep water.

NOW AVAILABLE . . .

- 37% Inhibited Formaldehyde
- 37% Uninhibited Formaldehyde
- Methanol
- Acetaldehyde
- Propane
- Butane
- Gasoline
- Kerosene
- Fuel Oils

IN THE INTEREST OF complete utilization of natural resources, McCarthy Chemical Company is also the supplier of abundant natural gas to industries of the Texas Gulf Coast — cheap, highly efficient fuel from which has been extracted the hydrocarbons diverted to the needs of the chemical industry. These practical developments in forward-looking conservation are dedicated to "New Horizons in Hydrocarbons."

A GLENN McCARTHY ENTERPRISE

McCARTHY

McCARTHY CHEMICAL COMPANY

G. M. McGRANAHAN, *Vice-President and General Manager*

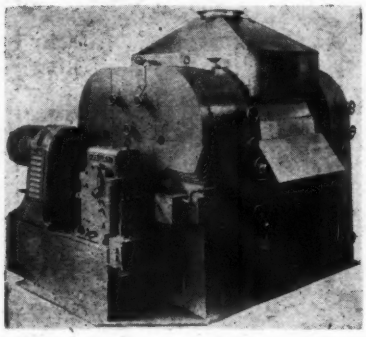
SHELL BUILDING — HOUSTON, TEXAS TELETYPE HO-181 — PHONE: PRESTON 7204

NEW EQUIPMENT

Drum Dryer QB758

F. J. Stokes Machine Co. is now producing a new pilot plant, single and double drum dryer and flaker.

The new Model 214-A, 2′ diameter by 2′ face atmospheric dryer is extremely flexible and can be used as a double drum dryer or a double drum flaker, or as a



single drum dryer or flaker by merely separating the drums and rotating only one. It can also be used as a twin drum dryer or flaker by rotating the drums in the opposite direction and feeding from below.

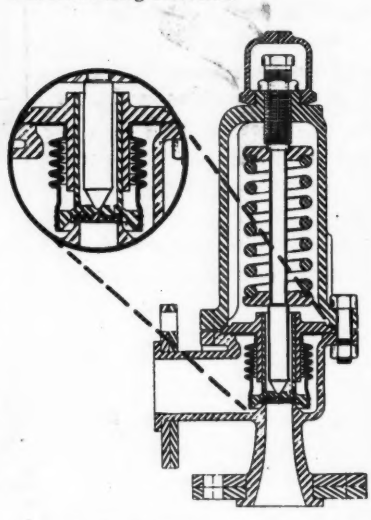
Furnished with two sets of drums, stamped in accordance with the ASME code for 160 psi maximum steam working pressure, the drums are available in a wide variety of metals. Drums can be either heated with steam or by other suitable heating mediums, or cooled with water for flaking or chilling.

Drum drive has a 24:1 speed range, with drive reversible for use with all types of feeds. A drum speed indicator eliminates the use of stop watch for every change in RPM. Instruments indicate drum clearances in thousandths of an inch. An automatic mechanism instantly increases the clearance between drums, to prevent surface damage from the entry of hard lumps or foreign objects.

Safety Valve QB759

New safety valve of Farris Eng'r. Co., isolates lading fluid from spring chamber.

The new sealing FarriSeal Bellows, or flexible joint, completely seals the springs, guides adjusting screws, etc., from the vapor or fluid in the body of the valve, thus minimizing corrosion.



The FarriSeal Bellows is an enveloping bellows built into the valve itself. It is made in type 316 stainless steel as a standard, and is also available in rubber and Neoprene for the chemical and corrosive-resistant types valves particularly.

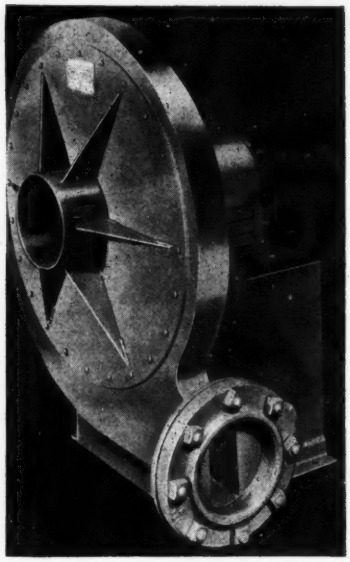
The bellows are so constructed as to allow the safety valve its full stroke plus over travel, and at the same time never reach the stress limits of the bellows themselves. The FarriSeal Bellows have been used where back pressures on the bellows have been as high as 150-lbs. with complete success and satisfactory operation.

Blower QB760

The new Turbo-Pressure blower of the Chicago Blower Corp. furnishes non-pulsating pressure or suction.

A flanged discharge and companion flange permits direct direct attachment to equipment, eliminating need for couplings or union in the new Turbo-Pressure blower made by Chicago Blower Corp. The front plate of this new "Chicago" Turbo-Pressure blower is reinforced with triangular gusset plates eliminating transmissional vibration and "breathing" and reduces the noise level.

Designed for furnishing air at high pressures, the blower is used extensively for applications requiring steady, non-pulsating air pressure or suction. Con-



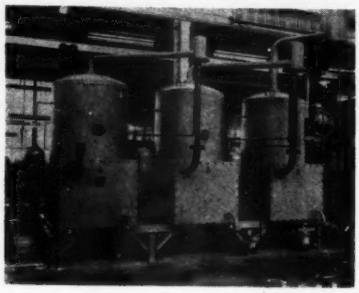
struction throughout is heavy 3/16" welded plate. Furnished in various sizes to deliver varying volumes of air, ranging from 80 cfm to 6,000 cfm, at pressures from 4 oz. to 2 lbs.

Water Still QB761

Low pressure exhaust steam is the heating medium for the new multiple effect water still of the F. J. Stokes Machine Co.

The completely-new Stokes multiple effect vacuum water still utilizes low pressure steam discarded from process equipment vessels, turbines, or steam pipes. Models range in capacity from 150-1000 gallons per hour. An outstanding feature

is the use of special double centrifugal entrainment separators, assuring water of highest purity. The conductivity of the distilled water coming from the still is



automatically recorded. Stokes vacuum water stills are available in either single, double, or triple effect models. Construction can be of stainless steel or monel metal.

• QB762 A *homogenizer* capable of operating at 8,000 p.s.i. has been developed by the Manton Gaulin Mfg. Co. This machine is essentially a three plunger positive displacement pump to force the product through homogenizing valves. The velocity through the valves approaches the speed of sound, said to result in an extremely fine particle size and minute dispersion unobtainable with other types of emulsifying equipment. It is possible to handle extremely abrasive materials without loss in efficiency. Laboratory machines are available for experimental work.

• QB763 A new *methane flow proportional counter* for the efficient detection of alpha particles is available from Naclear Instrument and Chem. Corp. The outstanding feature of this new Model

D45 detector is its ability to count alpha particles in the presence of high beta activity with 50% geometry and low coincidence losses.

When this detector is used with a high gain linear amplifier and a "fast" scaler, it is possible to count alpha particles in the presence of a beta activity of 5 (10)^9 disintegrations per minute. Measurements of this type are particularly useful in chemical, physical, and biological research.

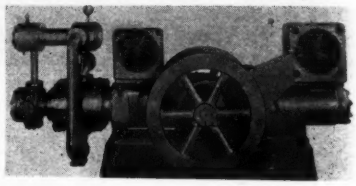
• QB764 Stainless-clad (Type 304) steel is now being manufactured by the Alan Wood Co.

The new Permaclad sheets consist of a layer of stainless steel inseparably diffwelded to a mild steel backing.

Permaclad has cold forming properties unattainable with solid stainless steel. It can be subjected to a much deeper draw without intermediate annealing with only minor changes of equipment or practice. There is no separation, no loss of corrosion resistance. Permaclad can be metal arc welded, spot-welded or soldered with ease and safety.

• QB765 A new direct-connected, engine driven *two-stage gas or air compressor* the Lorain 0-10TS, has been developed by the White-Roth Machine Corp.

The unit consists of a low-stage and a high-stage compressor cylinder driven by



means of a crosshead by Lorain Model O Multi-Fuel engine, which will operate on diesel oil, or on natural gas or butane. Engine conversion takes approximately 90 minutes.

Compressor cylinders, with circulating water cooling system, have top suction and bottom discharge for gas condensates. Engine power cylinder is cooled by circulating water or by a condenser-type system incorporating a belt-driven fan. Large capacity oil reservoir with combination splash and force feed provides adequate lubrication for all load or temperature conditions.

• QB766 National Carbon Co., has redesigned its Series 70 "Karbate" seven-tube impervious graphite *shell and tube heat exchanger*. It is now designated series 70A. Replacement of tubes may now be made quickly and easily in the field, thus eliminating the necessity of blocking off tubes and thereby reducing capacity. Two sizes, having effective outside tube areas of 16.4 sq. ft. and 24.6 sq. ft. are carried in stock.

• QB767 An improved *gauge glass protector*, #28 Kleervu, is available from Wright-Austin Co., for use as a safety guard to protect both employees and

Solvent . . . Versatile Intermediate . . . Heat Transfer Fluid

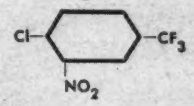
All These in *HOOKER MONOCHLOROBENZENE*

Hooker Monochlorobenzene is serving chemists in many different ways:

1. As a good general solvent, it is especially helpful in the manufacture of paints, varnishes, lacquers and their removers.
2. As an insecticidal intermediate, it is used in the preparation of DDT and other insecticides.
3. As a dyestuff intermediate, it is used in the preparation of sulfur black and brown dyes.
4. As a chemical intermediate, it is used in the manufacture of many organic synthetics, such as picric acid, phenol, dinitrochlorobenzene, drugs and perfumes.
5. As a heat transfer fluid—for condensing vapor systems where glass enameled jackets cannot stand high steam pressure, monochlorobenzene can be used in the range from its boiling point (130° C) up to about 190° C.

Hooker Monochlorobenzene is a clear colorless liquid of high purity. It is a carefully distilled material and after drying with calcium chloride, will distill within 1°C. For more complete physical and chemical information send on your business letterhead for Technical Data Sheet No. 703B.

HOOKER RESEARCH PRESENTS
3-NITRO-4-CHLOROBENZOTRIFLUORIDE
$C_6H_3CF_3$ [3-NO_2,4-Cl]



Molecular Weight	225.56
Freezing Point	−7.5°C
Boiling Point	222°C
Specific Gravity 15.5°/15.5°C	1.542
Refractive Index n20/D	1.491

To its growing list of organic fluorides, Hooker now adds 3-Nitro-4-chlorobenzotrifluoride. It is a thin yellow oily liquid. Indications are that 3-Nitro-4-chlorobenzotrifluoride is a valuable addition to the group of chemical intermediates. It is subject to further ring substitution in the number 5 position. The nitro group may be reduced in alkaline media. The chlorine atom is very stable and unlike other benzotrifluoride compounds, hydrolysis results in attack on the CF_3 group.

Patent literature discloses a variety of applications for nitrochlorobenzotrifluoride in the preparation of azo dyestuffs and pharmaceuticals. At present available in pilot plant quantities, production in commercial quantities can be quickly undertaken when circumstances warrant. Hooker Technical Data Sheet, gives more complete physical and chemical characteristics and literature references. When writing for literature or samples please use your company letterhead.

OTHER HOOKER CHLORO-BENZENES

- Hexachlorobenzene
- Orthodichlorobenzene
- Paradichlorobenzene
- 1, 2, 4, 5-Tetrachlorobenzene
- 1, 2, 4-Trichlorobenzene

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

3 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

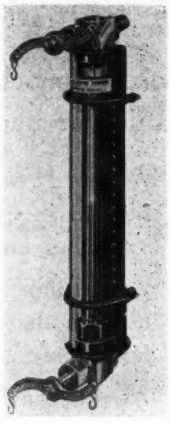
HOOKER CHEMICALS

9-90

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM TETRASULFIDE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

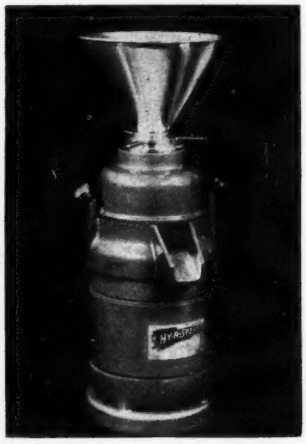
equipment against injury from flying splinters of glass, and the escape of harmful fluids, when a gage glass bursts.

The Kleervu protector completely encloses the gage glass. A metal guard



is placed at the back of the gage and the "Nuglas" protector on the front. Top and bottom cadmium plated supports for the protector have been redesigned to provide a lip which fits inside the "Nuglass" front, preventing the escape of injurious fluids.

• QB768 The new *mill* recently perfected by Hy-R-Speed, Inc., has 2 small abrasive stones, one stationary, the other



rotating at high speed, to produce extremely fast, efficient grinding, shearing and dispersing action. Mill is available with or without inside stainless steel finish, in a wide range of capacities to suit most requirements.

• QB769 The key characteristic of the DeZurik Easy-Operating *plug valve* involves an eccentric rubber plug face and an eccentric raised seat in the valve body. The plug, carried on journals at both ends,

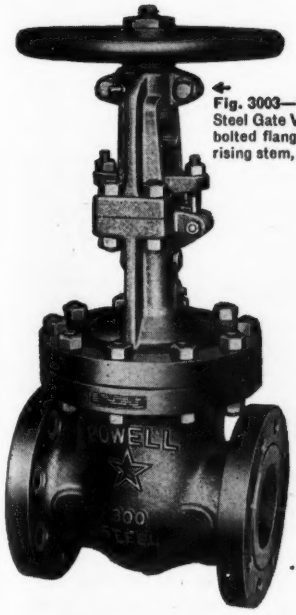
Safeguard your Production Goal with POWELL VALVES

Probably the chief reason why American Industry leads the world in productivity is the practice of setting up production goals—and then achieving them.

Naturally the achievement depends, to a large extent, on the human element; but in this technological age the efficiency of equipment—and especially flow control equipment—plays a major part.

That's why Powell builds a line of valves to meet the specific requirements of every known industrial flow control service. Furthermore, in every valve, long life and dependability have been emphasized.

So, no matter what your flow control problems may be, Powell has the answers. Write for full information on applications of Powell Valves.



← Fig. 3003—Class 300-pound Cast Steel Gate Valve with flanged ends, bolted flanged yoke, outside screw rising stem, tapered solid wedge.

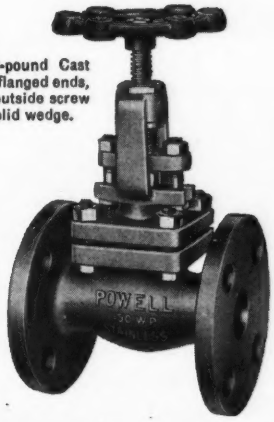


Fig. 1979—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke-bonnet and outside screw stem.

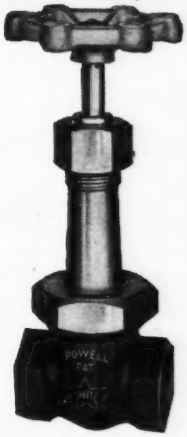


Fig. 375—200-pound Bronze Gate Valve. Screwed ends, union bonnet, inside screw rising stem and renewable "Powellium" wear-resisting nickel-bronze disc.

Fig. 1816—Large 125-pound All Iron Gate Valve. Made in sizes 2" to 30", incl. Has bolted flanged yoke, outside screw rising stem and tapered solid wedge.

The Wm. Powell Company
Cincinnati 22, Ohio
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

contacts the body seat only when the valve is completely closed. The slightest opening rotation of the plug totally releases the face from contact with the body seat.

Any ultimate wear which may effect the seating surface is fully and immediately compensated for by plug rotation to an advance seating position.

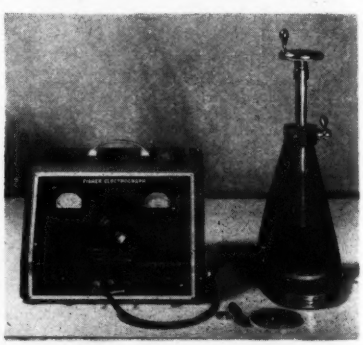
• QB770 Rock-Tred Corp. describes its new Resn-X *flooring* as a durable, but resilient heavy-duty resurfacer that can be easily brushed or troweled over any type of floor, to a thickness of 1/32" to 1/16" providing a wear-resisting surface that will put an end to chemical and solvent attack. It is non-slip and a top electrical insulator. Makes ideal safety stair-tread.

Resn-X is packaged in 6 gal. containers and is available in 3 standard colors: Tile Red; Utility Green and Medium Gray. Coverage per gallon is approximately 60 sq. ft., at 1/32" and 30 sq. ft., at 1/16" thickness. It can be walked on in 6 hours and dries hard for traffic in 24 hours.

LABORATORY EQUIPMENT

Electrograph LE117

The new Electrograph transfers electrically a few micrograms of a sample onto previously-prepared bibulous paper or a gelatin surface. Standard qualitative spot tests then indicate presence

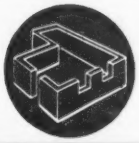


of elements. Current from an attached power source is delivered by leads provided to Press Stand where sample is held under controlled pressure against test paper. As transfer of metal is made, sample is an anode. An inert aluminum cathode support holds the test paper carrying an electrolyte selected for the particular determination being made. Current is applied, usually from 20 to 30 seconds, to carry a varying quantity of metal through the electrolyte and deposit it on the paper. It is produced by Fisher Scientific Co.

The color intensity of reaction on

Is this your problem?

Here's your answer!
MALLINCKRODT STEARATES

	***1** Making water-repellent building materials?*	**CALCIUM STEARATE** — renders water repellent such materials as cement, cement composition, wood, brick, stone, fiber and fabric.
	***2** Suspending pigments, producing "flatting" or increasing body in paints, lacquers, or varnishes?*	**CALCIUM STEARATE** **ZINC STEARATE** — produce flatting effect in lacquers. **CALCIUM STEARATE** **ZINC STEARATE** **MAGNESIUM STEARATE** — increase body in varnish; prevent settling of pigments in paints and enamels.
	***3** Preventing plastics from sticking to molds and dies?*	**CALCIUM STEARATE** — is added to plastics for internal lubrication and dusted into molds or onto dies for molding and extrusion.
	***4** Rendering crystals free-flowing and non-caking?*	**CALCIUM STEARATE** — coats crystals against moisture.
	***5** Making stable cosmetic powders?*	**ZINC STEARATE** **MAGNESIUM STEARATE** — produce soft, smooth, fluffy, odor-stable powders that have good covering power and add "bloom" to a face or body powder.
	***6** Molding medicinal tablets?*	**MAGNESIUM STEARATE** — in small amounts is an excellent tablet lubricant.

Mallinckrodt specializes in producing specialized stearates, particularly designed to meet the stringent requirements of users. When makers of butyl rubber needed a special grade of zinc stearate to stabilize their emulsions; when the U.S. Navy needed a special magnesium stearate for anti-flash burn ointment; when a cosmetic manufacturer needed a special type of zinc stearate to withstand higher temperatures during processing, *Mallinckrodt produced the answer.*

Our many years of experience in the uses of metallic soaps is at your service. We shall be glad to consult with you on your particular problem. Write us today.

82 Years of Service to Chemical Users

Mallinckrodt Chemical Works

Mallinckrodt Street, St. Louis 7, Mo.
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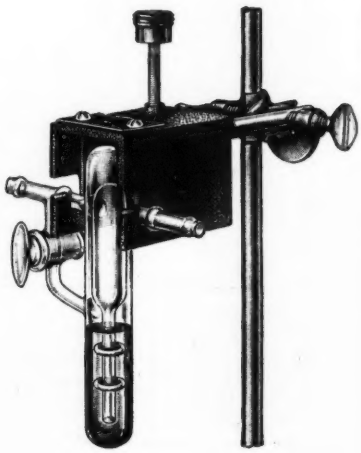
Montreal • Philadelphia • San Francisco

FINE CHEMICALS Mallinckrodt SINCE 1867

Uniform Dependable Purity

test paper varies both with time of "exposure" and with concentration of element in sample. Thus, employing samples of known concentration to plot a curve, and following uniform procedure, quantitative measurements can be made.

• LE118 The new *vacuum pressure regulator* of the Todd Scientific Co. controls pressure from 2.50 mm. of Hg by



filling the regulator to the line on an inner concentric tube. Lower pressures can be controlled if the amount of Hg is reduced. Use of dibutyl phthalate permits control of pressures from 0-4 mm. of Hg. The regulator is filled by removing from the metal housing and applying gentle suction to one arm while the other is immersed in the liquid.

• LE119 Central Research Laboratories *Microwave dielectrometer* is now available for determining the dielectric constant and loss at nominal frequencies of 1000, 3000, and 9000 megacycles. Obvious potential users are manufacturers of all types of insulating materials. There is also growing interest in correlation of dielectric loss data with other properties, such as the presence of small amounts of impurity in organic compounds, suggesting the use of the instrument in process control.

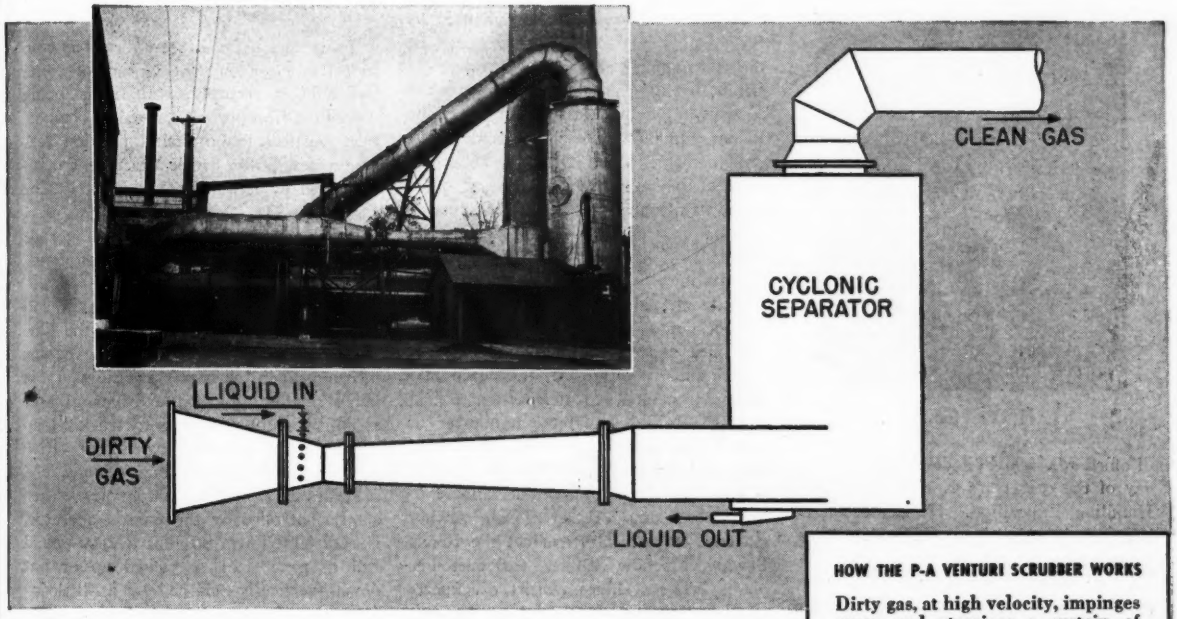
The instrument consists of a slotted wave guide, precision traveling probe, modulated klystron oscillators, probe output amplifier, associated power supplies and equipment. The sample to be measured is inserted ahead of a short-circuiting plug. The effect on the standing-wave pattern in the guide provides data for calculating the dielectric constant and loss. Solids are measured directly in the wave guide while auxiliary sample holders can be used for liquid samples and for measurements at controlled high and low temperatures. The range of measurement of a dielectric constant extends from 1 to 100; of dissipation factor from 0.0001 to 1.0. With ordinary care an accuracy of 1-2% can be achieved.

FOR DIFFICULT GAS CLEANING PROBLEMS

CHEMICO *Now Offers*

The P-A Venturi Scrubber

(A PEASE-ANTHONY DEVELOPMENT)



HOW THE P-A VENTURI SCRUBBER WORKS

Dirty gas, at high velocity, impinges upon and atomizes a curtain of liquid introduced through jets at the throat of the Venturi. Differential velocities of gas and atomized liquid result in collision of mist or dust particles with liquid droplets. The coalescence of mist or agglomeration of dust resulting from this collision makes simple cyclonic separation possible.

APPLICATIONS: The P-A Venturi Scrubber is a highly effective and economical apparatus for solving such major industrial problems as: SMOKE ABATEMENT · REMOVAL OF DUST AND MIST FROM GASES · RECOVERY OF VALUABLE METALS AND CHEMICALS.

ADVANTAGES: Highly efficient—Assures virtually complete removal even of sub-micron dust and mist.

Low initial cost—The first cost of the P-A Venturi Scrubber is considerably less than other equipment of equivalent performance.

Low Maintenance — Its maintenance cost is less than that of other equipment of equivalent performance.

Low Water Requirement — Requires generally less water (or scrubbing liquid) than other liquid scrubbers.

Can Handle Gas At Any Temperature—Pilot Plant tests show no difficulties even at 1800° F. Actual installations now operating at 700° to 800° F.

More Compact and Lighter—It requires less space and is lighter in weight than other equipment of equivalent performance.

Simple and Safe to Operate and Maintain—Any competent maintenance man can service a P-A Venturi Scrubber. No special skill is needed to repair equipment.

Chemico's engineering background and development facilities combined with Pease-Anthony's experience in gas scrubbing offers highly qualified service in this field.

CHEMICAL CONSTRUCTION CORPORATION

EMPIRE STATE BUILDING, 350 FIFTH AVENUE, NEW YORK 1, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE

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CHEMICO CHEMICAL CONSTRUCTION CORP

Chemico Plants are profitable investments

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Conklin Heads Materials Handling Institute

J. H. W. Conklin, sales manager of the industrial truck division of Clark Equipment Co., Battle Creek, Michigan, was elected president of the Materials Handling Institute at the annual election

J. H. W. Conklin

of officers held in Philadelphia on the last day of the recent 3rd National Materials Handling Exposition. He succeeded S. W. Gibb, Yale & Towne Manufacturing Co. sales manager.

Other officials elected for 1949 are: first vice-president, J. G. Bucuss, Acme Steel Co.; second vice-president, J. P. Lawrence, The American MonoRail Co.; secretary-treasurer, R. Kennedy Hanson.

Members of the Materials Handling Institute include the principal manufacturers of all types of materials handling equipment. The vast majority, of the members were among the 237 exhibitors at the 3rd National Materials Handling Show held in Philadelphia's Convention Hall. The number of exhibitors set a new high as did the number of visitors, estimated on the basis of a preliminary count to have been in the neighborhood of 18,000.

Contour Spray Stencils

Contour spray stencils for decorating and marking concave, convex and irregularly shaped objects with paint or sand sprays, are now being produced by Adolph Gottscho, Inc., New York manufacturers of marking equipment.

Made in various gauges of brass and copper to conform closely to the contour of glass, metal, fibre and plastic containers and products, the Gottscho Spray Stencils are said to mask out backgrounds so effectively that trademarks and other designs reproduce clearly and sharply, without objectionable halos or ragged edges.

New Educational Film on Bag Sewing Machines

A new sound-color motion picture, "A Stitch In Time," has been produced by the Packaging Service Department of Bemis Bro. Bag Co. as a supplement to the company's Sewing Machine Clinics. The 16 mm. film is in two parts, and in the combined projection time of about an hour, completely covers installation, operation, maintenance and repair of the major types of bag closing sewing machines.

Part I, of "A Stitch In Time", covers the technical side of sewing machine adjustment, maintenance and repair. Part II goes into the plants using these machines and shows a wide variety of installations, pointing out how each machine is adapted to its particular bag closing job and explaining a number of operational techniques commonly in use. A typical scene is shown below.

This film was developed as an aid to the three teams of bag closing sewing machine experts who conduct the Bemis Sewing Machine Clinics for customer plants. These clinics consist of experts who go from city to city giving lectures and demonstrations on sewing machine operation and maintenance for the benefit of customer plant representatives. These same experts are also available for plant service visits giving their help and advice where needed.

Although "A Stitch In Time" is intended as an instructional aid for the Bemis clinics, it is complete enough in itself to present a full educational program. As soon as distribution problems are solved, Bemis plans to make this film available to industrial groups requesting it for the instruction of plant personnel, both supervisory and operative.

New Roll-Handling Device For Power Trucks

Two steel arms of semi-circular contour that close on a heavy roll of paper and hold it securely while it is being picked up, transported, stacked or changed from vertical to horizontal position feature a new power truck attachment manufactured by Elwell-Parker Electric Co., Cleveland, O.

Developed primarily for unloading rolls from cars at warehouses, printing plants, freight stations and storages, it also is applicable to many other materials in roll form including casks, drums and the like.

The new unit is bolted to the rotary mechanism in place of a cradle. It is much smaller, giving the driver greater visibility; lighter, adding to truck's load capacity; and it holds a roll in a positive grip, important in speeding action safely.

Hydraulic clamping action of the two arms, controlled by the truck's operator, is sufficiently firm so that a 2000-pound roll of paper can be picked up or put down—vertically—clasped by as little as 6 inches of the roll's upper end. This power ul short grip facilitates "breaking"

Typical production scene from educational film.

Introducing Your
Union Multiwall Specialist

(His job is to make your packaging dollar go further)

YOUR UNION Multiwall Specialist knows how to tailor a package to meet the specific needs of your product and method of distribution. He has helped many firms reduce their packaging costs. He may be able to do the same for you.

Union Multiwall Bags are used in plants making more than 300 different commodities. They're speeding up packaging, cutting labor and shipping costs, giving added protection to the product—yes, and making customers happier.

Even if you're now using Multiwall Bags the Union Multiwall representative who calls on you can give you new ideas on packaging methods that may save you money. For he is backed by the specialized packaging knowledge of America's largest maker of paper bags—with its own forests, the largest completely integrated Kraft pulp-to-bag plant in the world, and skilled engineering and design experts.

Let him show you how Union resources and packaging experience can help you.

Multiple Protection

Opens Easily

Prevents Siftage

Empties Clean

TRADE MARK
UNION

UNION Multiwall Bags

UNION BAG & PAPER CORPORATION

233 BROADWAY, NEW YORK 7, NEW YORK

down the key rolls at car doors. Normal carrying position of the clamp is around the middle of the roll.

Surfaces that contact the roll are rubber padded; no part of the paper need be marred or damaged. In picking up a roll from horizontal position the truck's head-frame with extra tilting angle is rocked far forward and the arms engage the roll directly without need of a forward thrust from the truck.

On an all-electric truck, i.e., with electric-mechanical lift, the motor-driven pump for the hydraulic system is engineered into the clamping device, whereas in a truck equipped with hydraulic lift the same pump serves for the clamps.

Simple Selector for Corrugated Boxes

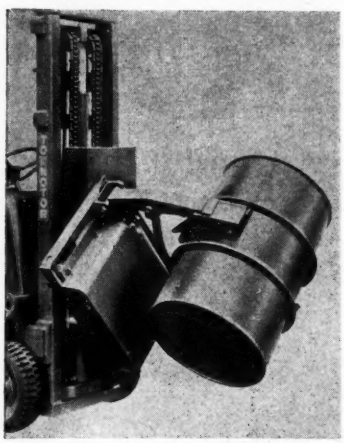
A simplified classification indicator which tells at a glance the corrugated box recommended for safe packing and shipment of articles in various weights and sizes has been prepared by The Hinde & Dauch Paper Co., Sandusky, Ohio. The indicator, which is reproduced below, will be sent by the company upon request.

When closed, the indicator is only two inches wide and fits easily into the vest pocket of the user. When opened, it shows quickly and without additional checking, the proper corrugated shipping box for an article of given weight and size. It is equally simple to ascertain from the new H & D indicator the correct weight of the corrugated board facings. Conversely, the chart shows, too, whether the corrugated boxes now used in packing and shipping operations meets Consolidated Classification requirements. The indicator covers both single wall and double wall corrugated boxes.

High Free Lift Truck, Barrel Grab Displayed

Among the outstanding exhibits at the 3rd Materials Handling Exposition in Philadelphia were a new high free lift fork lift truck and a revolving barrel grab, both made by the Towmotor Corp., Cleveland. The truck's free lift of 65 inches is said to be the most available in any fork lift truck.

The barrel grab is especially designed



to lift and transport open-end drums, discharging contents by turning the drum upside down. Drums with capacity up to 2100 lbs. and with diameters from 15" to 30" can be handled with ease since constant load pressure is maintained throughout the entire 360 degree revolution by means of a hydraulic line running through the spindle of the carriage oper-

Vest Pocket Classification Indicator

Double Face Corrugated Boxes				*Double Wall Corrugated Boxes*			
Weight of Shipment (Box and Contents)	*Use Box With Inside Area*	*Specify An H & D Box With Bursting (Mullen) Test of*	*Consolidated Classification (Rule 41) Requires Facings of Not Less Than*	*Weight of Shipment (Box & Contents)*	*Use Box With Inside Area*	*Specify An H & D Box With Bursting (Mullen) Test of*	*Consolidated Classification (Rule 41) Requires Facings of Not Less Than*
Up to 20 Lbs.	Up to 40 In.	125 Lbs.	52 Lbs. (Combined Weight)	Up to 65 Lbs.	Up to 75 In.	200 Lbs.	92 Lbs. (Combined Weight)
Up to 40 Lbs.	Up to 60 In.	175 Lbs.	75 Lbs. (Combined Weight)	Up to 90 Lbs.	Up to 90 In.	275 Lbs.	110 Lbs. (Combined Weight)
Up to 65 Lbs.	Up to 75 In.	200 Lbs.	84 Lbs. (Combined Weight)	Up to 120 Lbs.	Up to 100 In.	350 Lbs.	126 Lbs. (Combined Weight)
Up to 90 Lbs.	Up to 90 In.	275 Lbs.	138 Lbs. (Combined Weight)	Up to 140 Lbs.	Up to 110 In.	500 Lbs.	222 Lbs. (Combined Weight)
Up to 120 Lbs.	Up to 100 In.	350 Lbs.	180 Lbs. (Combined Weight)	Up to 160 Lbs.	Up to 120 In.	600 Lbs.	270 Lbs. (Combined Weight)

When weight of box and contents is less than authorized weight, inside area of box may be increased by one-half the percentage between actual weight and allowable weight.

Dress up your bulk shipments in

Decorated LEVERPAK DRUMS

choice of (17) colors . . . choice of (14) inks

NOW YOU CAN deliver your dry bulk products in style—make them part of your package "family"... traveling billboards through all stages of use and reuse.

Continental can supply you with improved Leverpak drums in any of seventeen eye-catching colors. We can reproduce your name and trademark in any of fourteen different inks. And there's no waiting for this service. We're set up to start the drums rolling your way as soon as you give us the word.

LEVERPAKS—unpainted or in colors—are the best-looking, most serviceable fibre shipping drums we have ever turned out. They load compactly and ride safely. The patented locking device is easy to open, easy to close. Metal chimes are flash butt welded for greater strength.

If you want a sturdier container . . . one that will "dress up" your bulk shipments, contact our nearest office for full details on Leverpak and other Continental drums.

CONTINENTAL CAN COMPANY

Paper Converting Division

VAN WERT • NEW YORK • PHILADELPHIA • PITTSBURGH
TONAWANDA • CLEVELAND • CHICAGO • ST. LOUIS • LOS ANGELES

ating the arms of the grab. This exclusive feature has many varied applications to industrial use.

Two New MCA Manuals

The Manufacturing Chemists' Association has recently published Chemical Safety Data Sheet SD-29 on Ethyl Ether, and Chemical Safety Data Sheet SD-30 on Sodium Cyanide, the 29th and 30th in a series of chemical product safety manuals prepared by them. Designed for supervisory staffs and managements, the manuals concisely present essential information for the safe handling and use of chemical products.

The chemical safety data sheets may be obtained at 20 cents per copy from the Manufacturing Chemists' Association, 246 Woodward Building, Washington 5, D. C. Remittance should be sent with each order.

Gas Lift Truck by Yale & Towne

The new "Lift King" gas truck being marketed by Yale & Towne Manufacturing Co. features fluid drive, automotive

controls, hydraulic piston lift (in two stages by means of a ram-within-a-ram) and low-mast heights with high free lifts. Entrance into the gas truck field by the company provides a supplement to its already existing electric truck lines.

Insulated Containers in Stainless Steel

Stainless steel containers incorporating the latest advances in high vacuum insulation have recently been introduced by the Emil Greiner Co., 20-26 North Moore Street, New York City 13, New York.

Absolutely unbreakable, these containers effect saving of time in filling, cleaning and sterilizing.

Sizes of the containers range from one-quart to 11 gallons. Each container has double-walled insulation.

CLOSES MULTIWALLS

"clam-tight"

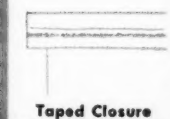
AT HIGH SPEEDS!

The famous BAGPAK® "cushion stitch"

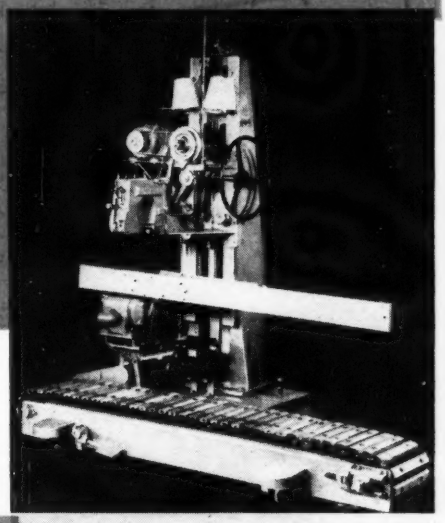
Your packaging time drops sharply when you're operating with a BAGPAKER.® Picture the savings from a machine that closes up to 15 heavy-duty multiwall paper bags per minute—a rugged long-lasting machine, too! And there's more than enough strength in a tough BAGPAKER closure. It's made with the "cushion stitch", which absorbs strains and won't pull out.

Check the features of both BAGPAKER models shown at the right. One provides high speed, dependable closing; the other, in addition, gives a closure that resists moisture and is proof against contamination and sifting.

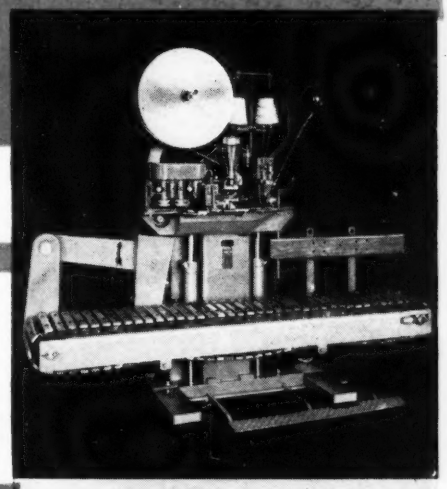
You're apt to discover more profitable closing and handling methods . . . more efficient multiwall bag uses, by discussing your needs with a BAGPAK engineer.



Taped Closure (Model "DA")—it's moisture-resistant, sift-proof, tough



MODEL "E 1" (portable)—closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.



MODEL "DA" (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute . . . 6 to 12 where filled bags are delivered to BAGPAKER conveyor. Sewing operation starts and stops automatically—no tape wasted.

BAGPAK DIVISION

INTERNATIONAL PAPER COMPANY, Bagpak Division • 220 East 42nd Street, New York 17

Branch Offices: *Atlanta, Baltimore, Boston, Chicago, Cleveland, Baxter Springs, Kans., Los Angeles, New Orleans, Philadelphia, Pittsburgh, St. Louis, San Francisco.*
In Canada: *Continental Paper Products, Ltd., Montreal, Ottawa.*

PLANT OPERATIONS NOTEBOOK

Liquid Flow Slide Rule

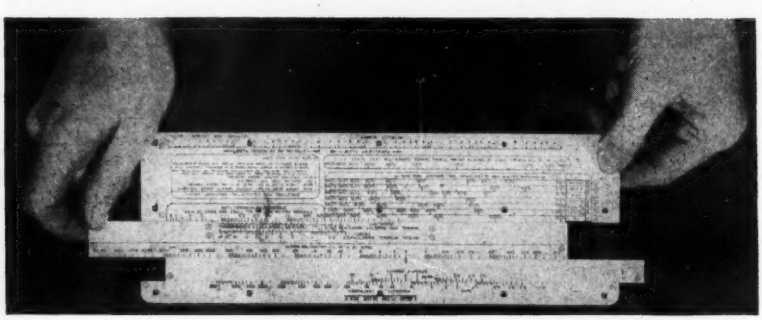
A slide rule for solving problems on the flow of liquids is now available from the inventor, Coleman J. Major, 2252 Fifteenth St., Wyandotte Mich. The slide rule solves the Fanning equation and may be used for calculating pressure drop, pipe diameter, or rate of flow for any liquid whose viscosity and density are known. The rule solves problems in either turbudent or streamline flow and automatically indicates what type of flow exists in a given system. It is constructed of Vinylite and measures 10½ by 3¾ inches.

The scales cover the following ranges: Viscosity, 0.1 to 10,000 centipoises; Specific gravity, 0.2 to 20; Rate of flow, 0.01 to 100,000 gallons per minute; Pipe diameter, ¼ to 24-inch pipe.

Safety Cards

Six new additions to the National Safety Council's series of Safety Instruction Cards are:

622. Carbon Disulfide
623. Trichloroethylene
624. Toluene and xylene
674. Solvents
689. Hydraulic filter press
775. Hazard spot card.



NOMOGRAPH-OF-THE-MONTH Edited by DALE S. DAVIS

Readers are invited to submit for publication in this department any original nomographs pertaining to chemistry or engineering. $10 will be paid for each one used.

Nomograph for Prediction of Critical Temperature

by JU CHIN CHU and K. H. HSU
Washington University
St. Louis, Mo.

THE critical temperature of a substance is of great value in predicting its behavior in certain processes and in establishing relationships among other of its physical properties. The experimental determination of critical temperature is difficult, and these data are not available for many substances. It is, therefore, frequently desirable to predict the critical temperature of a substance from other determined properties. Among a number of correlations for the prediction of critical temperature which appeared in the literature (1-4) (6-7), the Meissner and Redding relations seem more reliable and simpler for application. Their proposed empirical formulas are as follows:

For compounds boiling below 235°K and for all elements

$$T_c = 1.70T_B - 2.0 \quad (1)$$

where T_c = critical temperature (°K)
T_B = boiling temperature (°K)

For compounds boiling above 235°K
(a) Containing halogens or sulfur:

$$T_c = 1.41T_B + 66 - 11F \quad (2)$$

where F = number of fluorine atoms in the molecule.

Norblo

Outstanding in Efficiency and Adaptability for Industrial Dusts Control

Wherever continuous high recovery of industrial dusts and fumes is important for salvage or good housekeeping Norblo Automatic Bag Type Dust Collection has many design advantages. The Norblo automatic shaking and cleaning cycle is adjustable for dust loading and type of dust. Any one section can be cut out for inspection or bag replacement without seriously reducing the capacity of the unit... Norblo Automatic Bag Type Collectors, in nearly all situations, collect most dust for a given cost of power and maintenance. Norblo equipment also includes standard bag type, centrifugal and hydraulic dust collectors . . . If you have a dust problem, consult Norblo too. Or write for bulletins.

The Northern Blower Company

6418 Barberton Ave. • Cleveland 2, Ohio

Automatic and Standard Bag Type Fume and Dust Collectors, Norblo Centrifugal and Hydraulic Collectors, Exhaust Fans.

(b) Aromatic compounds and naphthenes free of halogens and sulfur:

$$T_c = 1.41T_B + 66 - r(0.383T_B - 93) \quad (3)$$

where r = ratio of noncyclic carbon atoms to the total number of carbon atoms in the compound.

(c) Other compounds (boiling above 235°K, containing no aromatics, no naphthenes, no halogens, and no sulfur):

$$T_c = 1.027T_B + 159 \quad (4)$$

Equations 2 and 3 can be combined to give:

$$T_c = 1.41T_B + 66 - r(0.383T_B - 93) - 11F \quad (5)$$

where r should be taken as zero for compounds containing halogens or sulfur. Converting the absolute temperature to centigrade.

$$T_c = 1.41T_B + 178 - r(0.383T_B + 11.6) - 11F \quad (6)$$

Let

$$R = T_c - 178 + 11F \quad (7)$$

Equation (6) becomes,

$$-R + T_B(1.41 - 0.383r) = 11.6r \quad (8)$$

Equations 7 and 8 can be represented by a nomograph of three parallel lines and one of two parallel lines and a curve respectively. Combination of Equations 7 and 8 gives Equation 6, the nomograph of which is presented here. For compounds boiling below 235°K and all elements, a stationary scale, which gives critical temperature directly if boiling point is known, has been drawn on the right hand side of the same figure.

The use of the nomograph can be well illustrated by the following examples:

Illustration 1. Acetaldehyde boils at 20.8°C; find its critical temperature. Since acetaldehyde is an aliphatic compound free of halogens and sulfur, r = 1 and F = 0. Align $T_B = 20.8$ with r = 1 to intersect at a point on the reference line. Align this point with F = 0 to intersect at $T_c = 187$°C which is the critical temperature. The experimental value is 188°C.

Illustration 2. Trifluotrichlorobenzene boils at 49°C; find its critical temperature. Since trifluotrichlorobenzene contains three fluorine atoms, F = 3 and r = 0. Align $T_B = 49$ with r = 0 to intersect at a point on the reference line. Align this point with F = 3 to intersect at $T_c = 214$°C. The experimental value is also 214°C.

Illustration 3. Dimethylaniline boils at 194°C; find its critical temperature. It is an aromatic compound with two noncyclic carbon atoms out of eight, r = (2/8) = 0.25, F = 0. Aligning as before, $T_c = 430$°C, whereas the experimental value is 415. The deviation based on absolute temperature is +2.18 per cent.

Illustration 4. Carbon oxysulfide, COS, boils at —50.2°C; find its critical temperature. Since it is a compound boiling below —38°C, the critical temperature

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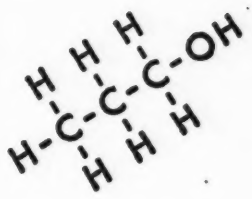

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PHYSICAL PROPERTIES

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ODOR		characteristic alcohol-like odor
SPECIFIC GRAVITY	20°/4° C	0.8044
DISTILLATION RANGE	ASTM °C	2° including true boiling point
WEIGHT PER GALLON	20° C	6.7 lbs.
SOLUBILITY		soluble in water and practically all organic solvents
FLASH POINT	open cup	85° F
BOILING POINT	1 atm.	97.2° C
FREEZING POINT		−127° C
VAPOR PRESSURE	100° F	0.9 lbs. per sq. in. absolute
RELATIVE EVAPORATION RATE		11.1 (ether = 1)

If you are looking for an improvement in your products, or short cuts in processing, the straight chain advantages of n-propyl alcohol are worth investigation. n-Propyl alcohol allows the solvent user greater solvent formulation freedom and can be used as a replacement and extender for higher alcohols. Call or write for additional information and specifications.

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can be found directly from the stationary scale based on Equation 1, to be 103°C. The experimental value is 105.0°C.

To check the accuracy of the nomograph, forty compounds have been tested and the average deviation is within 5 per cent with the exception of that for water.

Literature Cited

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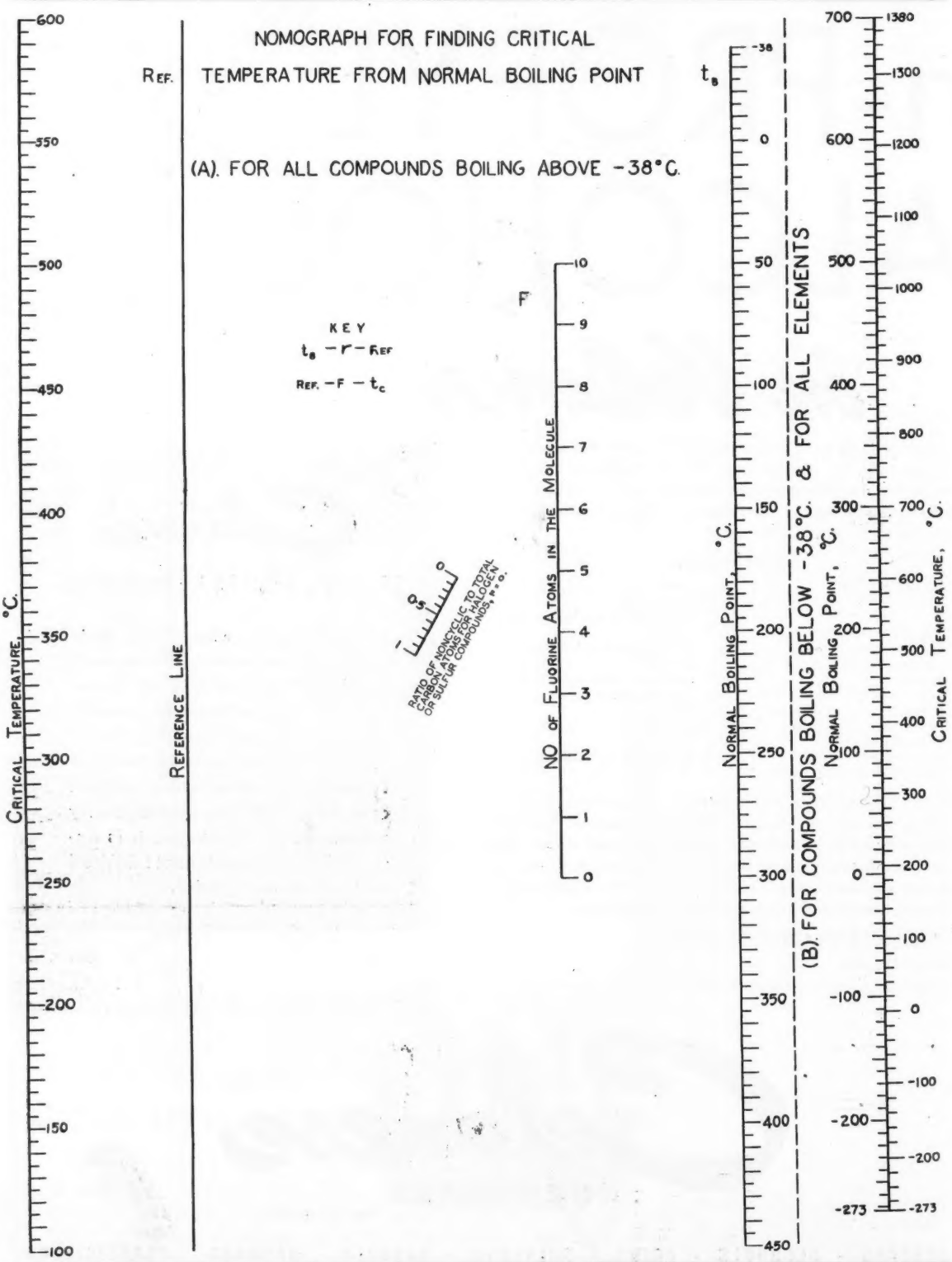

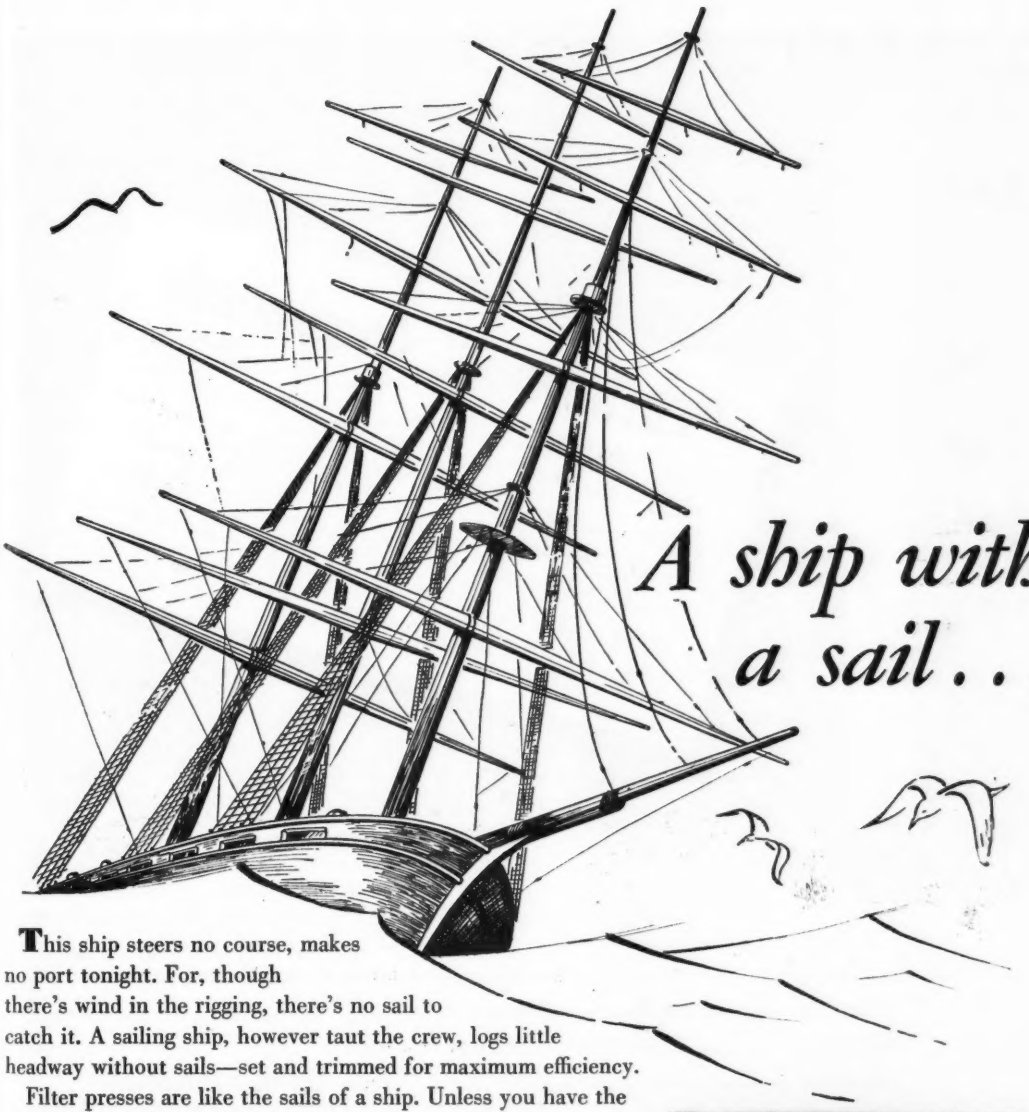

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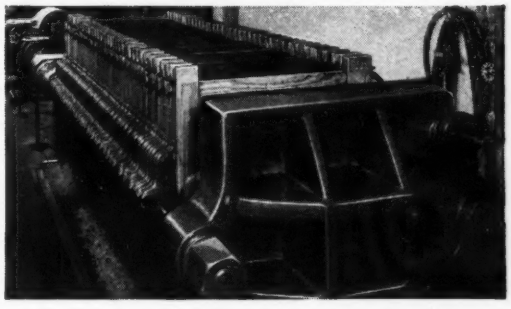

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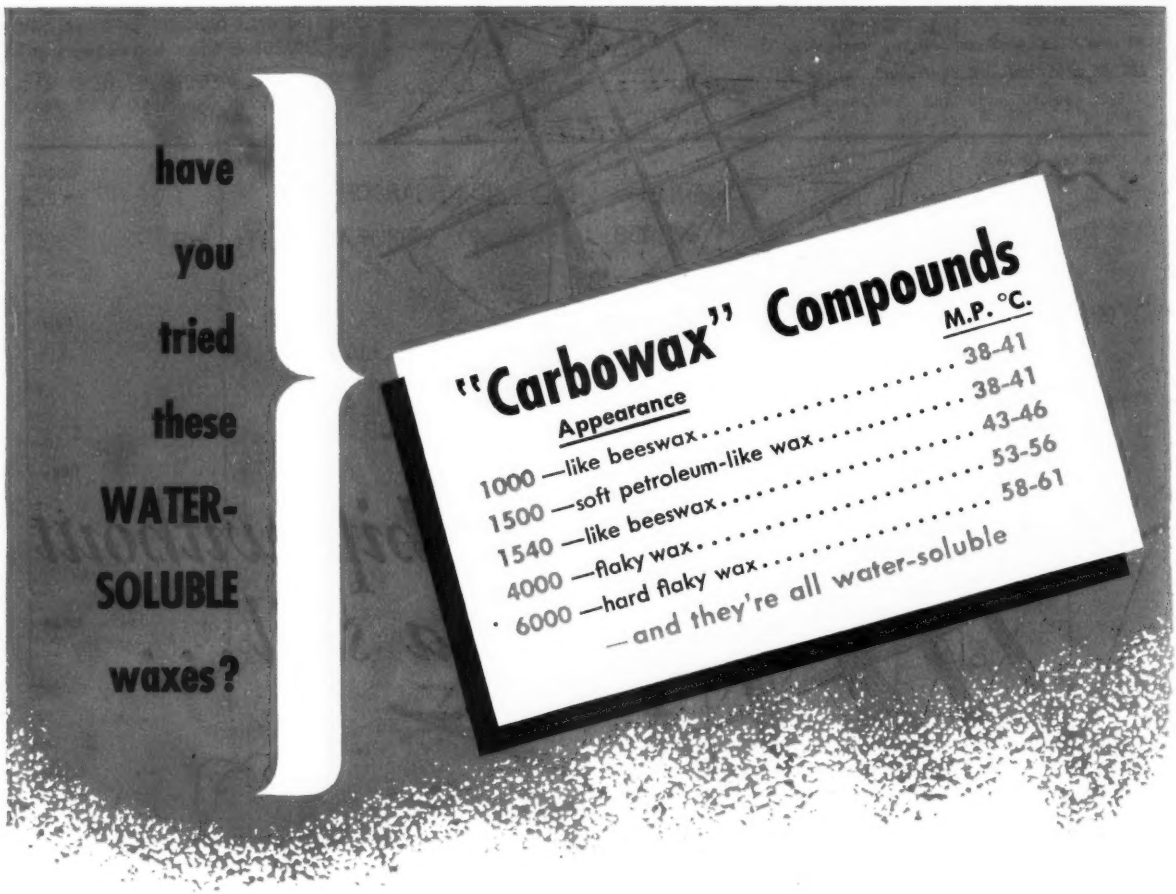

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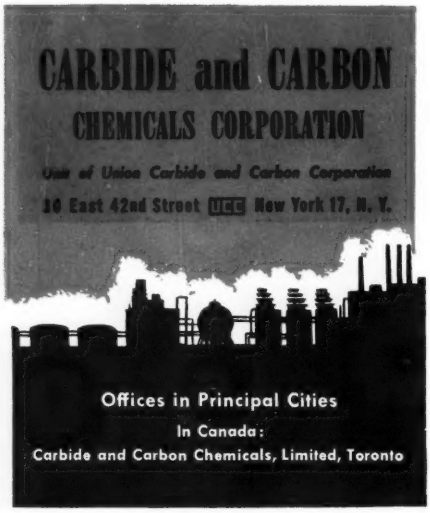

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BOOKLETS & CATALOGS

Chemicals

Di-iso-octyl Adipate.....B648
Specifications, properties and uses, together with other valuable data, on the plasticizer "Adipol 10A." 4 pp., Ohio-Apex, Inc.

Polish Base.....B649
Technical bulletin describing a castor type emulsifying base for the simplified production of polishes. 4 pp., E. F. Drew & Co., Inc.

Resins, Impregnating.....B650
"Plaspreg" resins for impregnating gypsum products are now available in three grades. They are described, together with prices, on a 1-p. data sheet. Furane Plastics and Chemicals Co.

Detergents, Steel Pickling.....B651
A new report describes the action of "Nytron" in steel pickling baths, giving a summary of research results and field trials. "Nytron in Steel Pickling," 14 pp., Solvay Sales Division, Allied Chemical & Dye Corp.

Silicone Rubber.....B652
A 24-p. illustrated bulletin (CDP 584) describes the properties, applications and performance of silicone rubber. A discussion of silicone chemistry fundamentals is also included. 23 pp., General Electric Co., Chemical Dept.

Alcohol, Acetylenic.....B653
Specifications bulletin on 3-Butyn-1-ol, with sections on physical properties, uses, chemical behavior and packaging. Data Sheet B, Farchan Research Laboratories.

Alcohols, Fatty.....B654*
Properties, uses, and analysis data on "Cachalot" cetyl, oleyl, and stearyl alcohols. 8 pp., M. Michel & Co., Inc.

3-Nitro-4-chlorobenzotrifluoride.....B655
Preliminary technical data sheet No. 367 gives physical data, description, suggested uses and applications, availability of a new fluorine compound. 2 pp., Hooker Electrochemical Co.

Bactericides and Cleaners.....B656
Series of six leaflets on products of Penn Salt Mfg. Co. for the dairy and allied industries has been prepared by the company's B-K Division. Products discussed are detergents, a chlorine bactericide, a cleaning alkali, and a bottle compound.

Detergents.....B657
Technical bulletin 21 describes the use of "Emcol 4150" as a car and truck washing detergent. Emulsol Corp.

Tricresyl Phosphate.....B658
Specifications bulletin No. S-07-1 gives physical and chemical data and specifications of three tricresyl phosphate grades. 2 pp., Celanese Corp. of America, Chemical Div.

Dyestuffs.....B659
A color card is a visual catalog of Eastman acetate dyestuffs now available. Tennessee Eastman Corp.

Di-iso-octyl Phthalate.....B660
Specifications, properties, uses, and other pertinent data on do-iso-octyl phthalate plasticizer. 4 pp., Ohio-Apex, Inc.

Anti-Foaming Agent.....B661
Properties and applications of "DC Antifoam A," a silicone compound for eliminating foam in aqueous systems. 4 pp., Dow Corning Corp.

Anti-Dermatitis Agent.....B662
Bulletin 222 summarizes cost to industry of dermatitis, its prevalence, and methods of preventing it. "Spun-Derma-C" hand cleaner is described. L. E. Hickes & Son, Inc.

Pentachlorophenol.....B663
Description of the use of "Santophen 20" in the preservation of wooden poles and cross-arms. 16 pp., Monsanto Chemical Co.

Bis(trifluoromethyl)benzene.....B664
Preliminary technical data sheet No. 368 gives properties, description, uses, and availability of a new fluorine compound. 1 p., Hooker Electrochemical Co.

Chemicals.....B665
A 32-page illustrated booklet covers the history, operations and products of Mathieson Chemical Corp. Also included is a description of the recently developed stationary mercury cell for the production of chlorine and caustic soda.

Acetophenone.....B666
Properties, solubilities, and reactions of acetophenone. Bulletin F-6970, 3 pp., Carbide & Carbon Chemicals Corp.

Emulsifiers.....B667
Technical bulletins 22 and 23 describe two emulsifiers, "Emcols H-30 and H-47," for insecticides, herbicides, and other agents dissolved in organic solvents to be emulsified in water. Emulsol Corp.

Oxo Compounds.....B668
A 27-page bulletin No.4 SP-99 describes the 9, 10 and 18-carbon atom compounds available from a new Oxo pilot plant. Rohm and Haas Co.

Resins, Textile.....B669
Textile finishing bulletin No. 121A describes "Superset" resin, a durable wrinkle-resistant finish for rayon and cotton. 7 pp., American Cyanamid Co., Textile Resin Dept.

Plastics, Cellulose.....B670
A new and revised edition of the technical booklet "Tenite Specifications," describes the various formulas of "Tenite" cellulose acetate and Tenite cellulose acetate butyrate plastic. 42 pp., Tennessee Eastman Corp.

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A 25-p. bulk price list for chemicals manufactured and sold by B. L. Lemke & Co., Inc.

Detergents.....B672
Specifications, description and uses of "Sulframin E," an alkyl aryl sulfonate in liquid form, claimed to offer savings over the conventional dry form. 11 pp., Ultra Chemical Works, Inc.

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A 28-page catalog contains information and prices of essential oils, aromatic chemicals and flavors distributed by Ungerer & Co.

Beta-Resorcylic Acid.....B674
A new technical bulletin describing the properties, uses, and chemical reactions of beta-resorcylic acid. Bulletin No. C-8-131, Chemical Division, Koppers Co., Inc.

Carboxymethylcellulose.....B675
Properties, preparation for use, and applications of carboxymethylcellulose, also known as cellulose gum. 12 pp., Hercules Powder Co.

Asphaltic Mastics.....B676
A 40-p. booklet describing asphaltic mastics, including automobile undercoatings, flame-proof deadeners, sand-filled and sandless deadeners, sealers, asphaltic paints, rust preventives, railway mastics, and box coatings. 39 pp., Witco Chemical Co.

Tin, Analysis for.....B677
A research paper describes rapid determination of tin in copper base alloys. Silverstein and Pinsof, Inc.

Equipment

Infra-Red Heater.....J104
Porta-Flexer heater designed for flexibility in operation. "Miskella Porta-Flexer," 2 pp., Miskella Infra-Red Co.

Stirrers, Explosion-Proof.....J105
Variable speed laboratory stirrers especially for safety in hazardous atmospheres. 2 pp., Vandergren Equipment Co.

Motors.....J106
Squirrel-cage across-the-line induction motors from 60 to 250 HP. Bulletin 1300-PRD-195, 2 pp., Electric Machinery Mfg. Co.

Relays.....J107
Miniature magnetic relays for automatic and remote control circuit applications where space is limited. Bulletin 102, 1 p., Ward Leonard Electric Co.

Pump, Boiler Feed.....J108
A new bulletin, W-318-B7E, gives all data and specifications for four new boiler feed pump sizes—two 6" and two 8"—added to the company's line of centrifugal pumps. Worthington Pump and Machinery Corp.

Motor Starters.....J109
An illustrated bulletin describing a magnetic motor starter and magnetic contactor designed to give maximum protection to alternating current motors up to 50 HP. and 440 V. Bulletin TEC-11, Trumbull Electric Manufacturing Co.

Valves, Solenoid.....J110
Solenoid operated valves. Booklet No. 311, 12 pp., Ross Operating Valve Co.

Speed Controller.....J111
Speed control for alternating current power up to ½ HP. Useful for mixers, grinder, pumps, etc. Bulletin GEA-5179, General Electric Co.

Soldering Sets.....J112
Equipment for all types of soldering and brazing in production, maintenance, and repair work. Bulletin C-1, 4 pp., Ideal Industries Inc.

Scaffolds.....J113
Steel rolling scaffolds fabricated from four basic parts for installation and repair work. Bulletin PTS-13, 4 pp., Patent Scaffolding Co., Inc.

Heat Exchanger Tubes.....J114
"On-the-spot" de-scaling of fouled heat exchanger tubes with specially developed mechanical cleaners is discussed in a paper reprinted for general distribution. 7 pp., Thomas C. Wilson, Inc.

Trucks, Lift.....J115
Description of a series of lift trucks of 3,000 to 8,000 pounds capacity. Bulletin 5151, 8 pp., Yale & Towne Mfg. Co.

Photographic Plates.....J116
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Description, specifications, performance chart, and selection table for a series of centrifugal pumps. Bulletin 622, 8 pp., Goulds Pumps, Inc.

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Folder describing "Stonhard Stonfast," a material to repair ruts and holes in plant floors. Stonhard Co.

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Catalog describing physical characteristics and retention values of a complete line of filter papers, together with reference tables for filtration and a discussion of proper selection for use in chemical analyses and biological procedures. Catalog No. 70, 36 pp., Carl Schleicher & Schuell Co.

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Discussion of the "Dynatork" drive, a clutchless, magnetic induction mechanism for fork and lift truck power transmissions. 9 pp., Industrial Truck Division, Clark Equipment Co.

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Pressure Regulator.....J126

Description and operating instructions for a combination vacuum pressure regulator and leak indicator adaptable to many laboratory vacuum operations. 2 pp., Todd Scientific Co.

Defrosting System.....J127

Details of an automatic hot gas defrosting system showing operation at various stages of a defrosting cycle of a typical two-evaporator system. Bulletin DF-100, 4 pp., Patterson-Kelley Co., Inc.

Belt Drives.....J128

100-p. manual to assist engineers in designing both multiple and light-duty V-belt drives. Mechanical Division, U. S. Rubber Co.

Oil Burners.....J129

Description, specifications, and operating information on oil burners for the company's internal fire boxes. Part 6, Section 3, Catalog 54, 9 pp., Black, Sivalls & Brysons, Inc.

Corrosion, Galvanic Cell.....J130

Reasons for galvanic cell corrosion as well as methods for helping to overcome it are contained in an 8-p. booklet for the production man and engineer. International Nickel Co.

Equipment Repair.....J131

Bulletin C-2 describes the use of a series of resins to protect and repair metal equipment for corrosive service. 4 pp., Carboline Co.

Controls, Photoelectric.....J132

Specifications of Photoswitch series 20 and 21 controls for general industrial and machinery applications. Bulletin PA 478, 2 pp., Photoswitch Inc.

Laboratory Equipment.....J133

Laboratory Equipment Bulletin No. 106 describes features of a new microscope and a new thermostatically controlled stainless steel water bath. Will Corp.

Conveyors.....J134

Bulletin DT-48 describes a horizontal power belt conveyor and includes information on motors, belts, and pulleys and bearings used therewith. Rapids-Standard Co., Inc.

Control, Hammer Mill Feed.....J135

Bulletin 149-2 describes a constant feed control to be used in connection with hammer mills. 4 pp., J. B. Sedberry, Inc.

Smoke Indicator.....J136

Bulletin PE 478 describes a photoelectric device which indicates continuously the density of smoke passing through the flue and signaling when this exceeds a predetermined value. 4 pp., Photoswitch, Inc.

Inspection Device.....J137

A 10-p. bulletin describes the new "Probolog," Model E, an electronic instrument for non-destructive inspection of non-magnetic metal tubing. Shell Development Co.

Gage, Boiler Water.....J138

A new liquid level gage for boilers is characterized by high visibility and accuracy. "Jerguson Trulevel Gage (Model A)," 2 pp., Jerguson Gage and Valve Co.

Motors, Induction.....J139

Bulletin PB 7000-1 describes two-pole, 250-3500 hp, Fabri-steel induction motors. Drip-proof, splash-proof, enclosed, self- or separately-ventilated types. 4 pp., Elliott Co.

Aprons and Sleeves, Plastic.....J140

Translucent plastic aprons and sleeves for protection against chemicals, greases, dirt, and solvents in the processing industries are described in Bulletin CZ-2, 2 pp., Mine Safety Appliances Co.

Oil Equipment Catalog.....J141

A condensed general catalog describes separators, emulsion treaters, heaters, tanks and other products of the company. 54 pp., Black, Sivalls & Bryson, Inc.

Hoists.....J142

Folder DH-65 describes a line of electric hoists of ½ to 10 ton capacity. 6 pp., Wright Hoist Division, American Chain & Cable Co., Inc.

Materials Handling.....J143

Catalog 1123 describes the Load-Grab, an attachment to handle palletless materials with lift trucks. 8 pp., Hyster Co.

Instruments.....J144

Catalog ND46(1) describes the company's complete line of indicators, indicating recorders and recording controllers. 44 pp., Leeds & Northrup Co.

Cements, Acid-Proof.....J145

A 6-p. bulletin describes two acid-proof products used in the construction of acid pickling tanks, pits, vats, sewers, floors, foundations and stacks. Sauereisen Cements Co.

Walkways, Loading Racks.....J146

Prefabricated units for assembling walkways, stairways, tank car loading racks, pumping unit platforms, and other miscellaneous operating platforms around refineries and chemical plants, are described in Part 1, Section 6, Catalog 54, 42 pp., Black, Sivalls & Bryson, Inc.

Steam Separator Chart.....J147*

Chart enables selection of the most efficient size and type of steam separator for a specific installation and determines pressure drop through the separator. Wright-Austin Co.

Grid Trays.....J148

Catalog G-48 describes grid trays for handling foodstuffs, chemicals and other materials in extractors, process equipment and pressure vessels; clay, Raschig rings, etc., in fractionating columns and towers, and "cat" baskets in petroleum refineries; etc. 4 pp., Kerlow Steel Flooring Co.

Heaters, Tubular.....J149

Part 5, Section 3, Catalog 54 describes various types of tubular heaters, giving construction, applications, specifications. 22 pp., Black, Sivalls & Bryson, Inc.

Chlorine Dispenser.....J150

Catalog Section 61 gives full information on the "Rato-Chlor," a unit designed to control and measure chlorine flow. 12 pp., Fischer & Porter Co.

Rubber Tubing Chart.....J151

A handy wall chart provides illustrations in actual size of the various sizes and types of rubber tubing, providing for quick identification. Price list per foot of various grades is also given. Arthur S. La Pine & Co.

Steam Traps.....J152

A booklet, "Solving Steam Trap Problems," gives information on selection of steam traps, together with pertinent engineering data and theory. 36 pp,. V. D. Anderson Co.

Materials Handling.....J153

12-p. catalog describes and illustrates all types of overhead handling equipment including cranes, jibs, monorails, and accessories. Abell-Howe Co.

Compressor Chart.....J154*

Chart simplifies selection of proper size air compressor for average industrial use. Bulletin L-640-B2, 4 pp., Worthington Pump & Machinery Corp.

Illumination.....J155

Micro-lights, magnifier lights, inspection spotlights' ultraviolet lights, fluorescent illuminators, and microscopical illuminators for plant and laboratory. 4 pp., Emil Greiner Co.

Metallizing.....J156

4-p. bulletin describing process and application of metallizing for making mechanical repairs and protecting surfaces against corrosion and contamination. Metalweld, Inc.

Insulation.....J157

4-p. folder describes "Zerolite" insulation for low-temperature service. Essential data and suggested uses for the material, which comes in the form of sheets, lagging, and pipe insulation, are included. Johns-Manville.

Magnetic Pulleys.....J158

Bulletin 350 describes permanent magnetic pulleys for automatic removal of tramp iron, reclamation, and separation. It describes features, and gives specifications, dimensions, capacities and typical applications. Stearns Magnetic Mfg. Co.

Heat Exchangers.....J159

Design and service of four types of heat exchangers using Karbate as protection against corrosive fluids and gases are featured in an 8-p. brochure. Foster Wheeler Corp.

Pumps, Multistage.....J160

Centrifugal, multi-stage, split case, volute type pumps designed for medium and high pressure service, with heads to 2,000 feet and capacities from 100 to 4,000 gpm, are described in a 16-p. bulletin, No. 48-4000, Byron Jackson Co.

Scales, Dial.....J161

Bulletin 666, 8 pp., gives specifications of dial scales and describes a "Tape-Drive" feature which obviates racks and pinions. One new model is described. Howe Scale Co.

Pump Construction.....J162

"How to Get Longer Service from Your Pumps" discusses four factors that affect pump life: corrosion, corrosion-fatigue, erosion and wear. Selection of proper materials to combat these factors is outlined. 8 pp., International Nickel Co.

Pump, Centrifugal.....J163

Description, specifications, and applications of a single-stage, horizontal, split case pump for water and alkaline liquids up to 16,000 gpm. "Peerless Type A Centrifugal Pump," 20 pp., Peerless Pump Division, Food Machinery & Chemical Corp.

Electric Heating.....J164

Bulletin O-40-W describes "Sta-Warm" compound and wax heating, melting, dispensing and pouring equipment. 4 pp., Sta-Warm Electric Co.

Trucks, Industrial.....J165

4-p. bulletin illustrates 20 different models of electric industrial trucks and tractors, and discusses selection of the correct type and model under various conditions. Crescent Truck Co.

LABORATORY NOTEBOOK

Rare Chemicals

The National Registry of Rare Chemicals, 35 W. 33rd St., Chicago 18, Ill., is seaching for the following materials:

6-Menthen-2-ol
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3-(Hydroxymethyl) indene
2,4-Dimethyl-5-phenylthiazole
2-Methoxyhydroquinone
2-Ethoxyhydroquinone
3,3′,4,4′-Tetrahydroxydiphenyl
3,3′,4,4′-Tetrahydroxydiphenyl ether
4-Phenoxycatechol
α-Naphthothiazole
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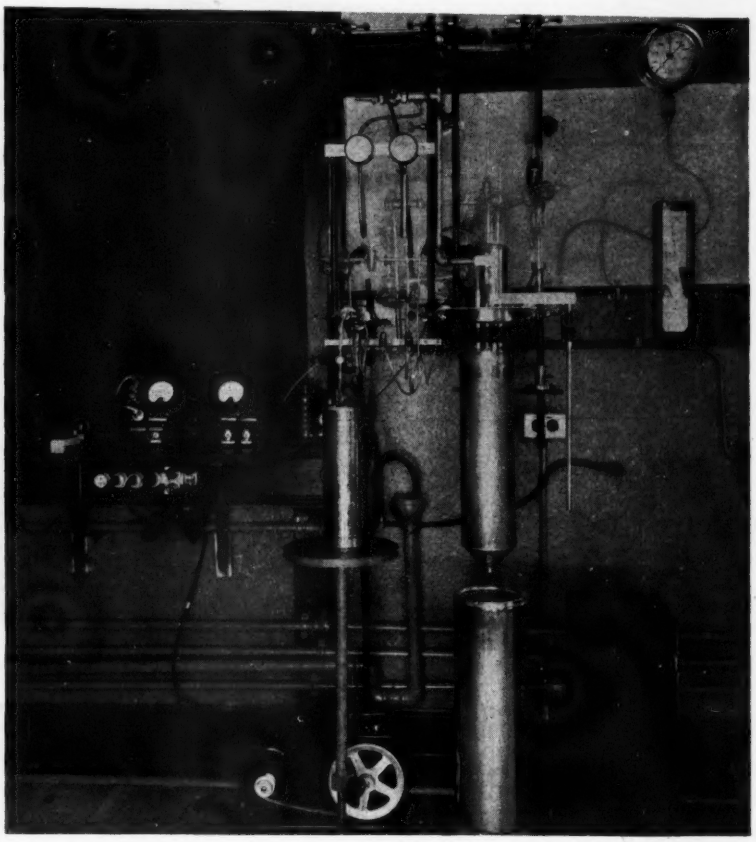
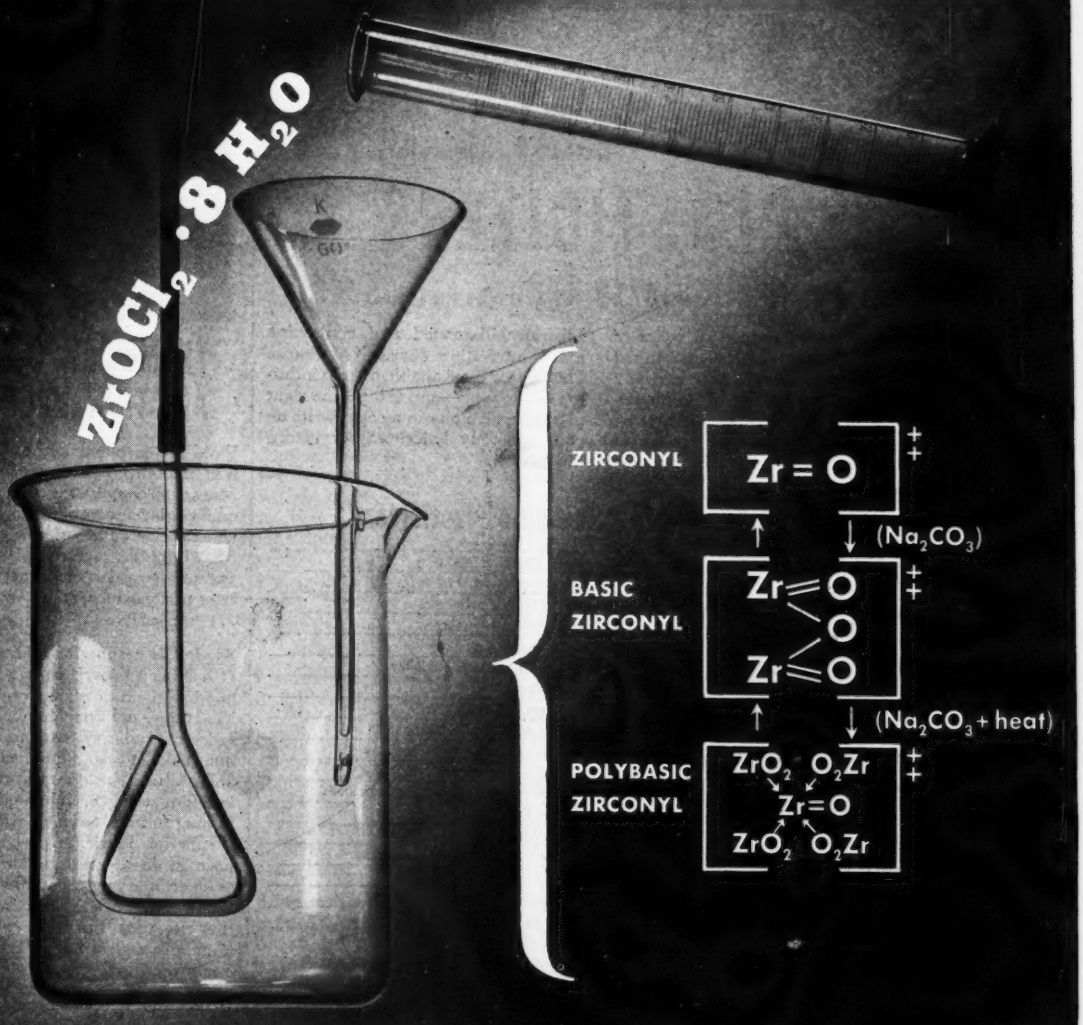
Vaccenic acid

Helium Liquefier



In the new helium liquefier of the National Bureau of Standards compressed gas is first cooled with liquid air and liquid hydrogen. Further cooling by expansion through a throttle valve produces liquefaction within a thick-walled high-pressure chamber. This chamber, together with an outer jacket containing pumped liquid hydrogen, is supported in an evacuated container, in turn surrounded by liquid hydrogen in a sealed Dewar flask (rt. of ctr.). Raising the liquid-air Dewar provides a bath of liquid air around the sealed hydrogen Dewar. Helium to be liquefied is filtered through liquid air-cooled charcoal in the cylindrical container at the left of center and then enters the liquefier through coiled tubing. Here the gas is gradually cooled by contact with liquid air, escaping hydrogen vapor, and liquid hydrogen before it reaches the pressure chamber. The transfer siphon at the right of the liquefier delivers liquid helium. The vacuum within the liquefier is measured by the ionization gage at left. The two small pressure gages at the upper center give the pressure of the pumped hydrogen. The temperature within the liquefier is indicated by a gas thermometer while the large dial at the upper right indicates the pressure of the liquefying chamber.

UNUSUAL IONS WITH USEFUL APPLICATIONS



Upon dissolving zirconium oxychloride in water, a number of ionic individuals is obtained. The preponderance of particular ions can be easily controlled by adjusting the temperature and pH of the solution. This permits a surprising number of physical and chemical properties to be realized from this one zirconium salt. These properties have already been successfully exploited in the preparation of a wide variety of chemical products. Many additional uses are in prospect.

Manufacturers interested in better catalysts, mordants, pigment lakes and toners, leather tanning, pharmaceuticals and numerous other chemical products may obtain detailed information through our New York Office.

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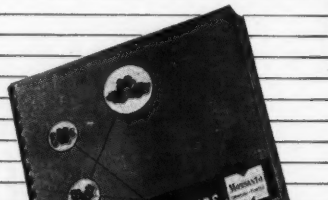
FOR YOUR INFORMATION

New treatise on PLASTICIZERS now available to industrial users

As a service to industrial users of plasticizers, Monsanto has published a new 80-page treatise entitled "Monsanto Plasticizers." It is a comprehensive discussion of plasticizing action and the performance results of Monsanto plasticizers.

Liberally illustrated and containing many interesting charts, "Monsanto Plasticizers" is available to help industry in choosing—and using—the right plasticizer. To obtain a copy, write on your company letterhead, or return the coupon.

Subjects Covered in "Monsanto Plasticizers"



- How a Plasticizer Works
- Evaluating Plasticizers
- Monsanto Plasticizers
- Compatibility
- Performance:
  - Low-Temperature Flexibility
  - Flexibility
  - Flame Resistance
  - Elongation and Tensile Strength
  - Hardness
  - Abrasion Resistance
  - Flow Properties of Molding Compounds
  - Toxicity
  - Electrical Properties
- Permanence of Monsanto Plasticizers:
  - Volatility
  - Water Resistance
  - Oil Resistance
  - Migration
- Solubility of Monsanto Plasticizers in Solvents
- Recommended Plasticizers for Specific Applications
- Technical Service

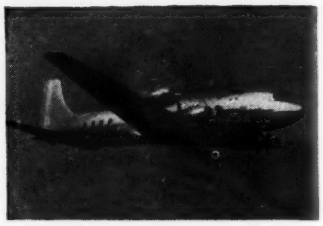
ORTHODICHLOROBENZENE

Low-flammability cleaning solvent recommended for use in garages, machine shops, die works, tool rooms

A versatile solvent, orthodichlorobenzene has the unusual advantage of combining high solvent power and low toxicity with low flammability. In recent tests, rags soaked in the chemical would barely support combustion when exposed to flame—snuffed out when flame was removed. Blends of gasoline or kerosene and orthodichlorobenzene are relatively nonhazardous cleaning agents for machine shops, die works, garages and tool rooms. It is also recommended as a paintbrush cleaner and "spotting" agent.

Now available in convenient 5-gal. packages

As a service to small-volume consumers, Monsanto is now packaging orthodichlorobenzene in quantities as small as five gallons . . . For information on its many uses, send for a copy of the booklet, "Monsanto Orthodichlorobenzene."



TEAMWORK SOLVES AVIATION PROBLEM

Fluid for airplane hydraulic systems was a complicated problem until Monsanto chemists and Douglas Aircraft engineers combined their research efforts. The result of this teamwork: SKYDROL . . . a non-flammable pressure-transfer medium that gives *extra* performance . . . *extra* economy . . . *extra* safety.

Skydrol is a superior hydraulic fluid. It has been proved in the laboratory and has given excellent results in service. It does not burn . . . does not corrode hydraulic system metals . . . is non-toxic. It is stable to heat, pressure and altitude . . . does not thicken nor lose film strength, volume or viscosity in long service. Skydrol also serves as a superior lubricant, keeping pump parts in good condition twice as long as do ordinary petroleum hydrocarbon fluids. Skydrol's properties indicate that its uses may be extended to numerous industrial pressure-transfer applications.

If you build, operate or service airplanes, it will pay you to investigate Skydrol . . . It may also be worth your while to try Skydrol for other industrial uses. Data and samples sent promptly upon request.

HOW CAN YOU USE THESE?

ortho-NITROCHLOROBENZENE

BENZYL CHLORIDE

Now available in quantity from Monsanto, these chemicals have wide possibilities in addition to their many established uses. Write for specifications and samples.

NOW READY FOR TEXTILE MILLS

Sterox 5 and 6 are Non-ionic Type Detergents and Wetting Agents—Economical, but High in Efficiency

Sterox* No. 5 and Sterox No. 6, two highly efficient, non-ionic detergents and wetting agents, are now available to the textile and dyeing industries in quantity and at favorable prices.

These clear, amber-colored detergents and wetting agents are polyoxyethylene thioethers which contain no alkali. They can be compounded with other non-ionic, an-ionic and cat-ionic surface active agents, improving many of the properties of materials to which they are added. Stable over wide ranges of pH and heat, the Steroxes are efficient in solutions that are hot or cold, hard or soft, acid or alkaline. In addition to being effective detergents and wetting agents, Sterox No. 5 and Sterox No. 6 are excellent for dispersion and emulsification.

Supplied in highly concentrated form, without builder salts, it is seldom necessary to use Sterox No. 5 or Sterox No. 6 in concentrations of more than 0.05%. This and the favorable prices make the Monsanto Steroxes economical to use. Being liquids, they are easier to apply with accuracy.

TEXTILE MANUFACTURE . . . Sterox No. 6 is a rapid wetter and is efficient and economical in any operation that requires a detergent or wetting agent. It is exceptionally good for scouring woolen skeins and piece goods. It is effective as a rewetting agent in Sanforizing and, left as a residue, it makes new towels more absorbent.

DYEING PROCESSES . . . Steroxes can be used with great success in dyeing and scouring operations. Being non-ionic, they are compatible with any type of dye bath used. Because of their penetrating ability, the Steroxes speed up dyeing operations and yield thorough, even color.

DATA AND SAMPLES . . . Data and samples of Sterox No. 5 and Sterox No. 6 will be sent upon request. Use the coupon, contact the nearest Monsanto Sales Office or write: MONSANTO CHEMICAL COMPANY, Phosphate Division, at address shown on coupon.

AROCLORS

More protection in modified and synthetic rubber coatings

(Technical Bulletins Available)

Monsanto AROCLORS (chlorinated biphenyl and chlorinated polyphenyls), used as plasticizers or resins for modified and synthetic rubber coatings, such as Parlon and Pliolite, add qualities that give extra durability. In coatings for concrete, metal and wood surfaces, and for uses requiring good electrical insulating properties, AROCLORS provide the following:

1. Greater toughness and adhesion.
2. Stronger resistance to corrosion, flame, water and weather . . . to acids and alkalies.

There is a series of Monsanto AROCLORS, liquids and resins, with special properties designed to meet specific requirements for a wide variety of industrial applications. For full information, send for copies of technical bulletins listed below.

Literature on Monsanto AROCLORS

"The AROCLORS"—Application Data Bulletin No. P-115.

"AROCLORS as Used in Chlorinated Rubber"—Technical Bulletin No. P-124.

"AROCLORS as Used in Pliolite S-5" —Technical Bulletin No. P-126.

"AROCLOR Incombustible Lubricants Used in High-Pressure Compressors"—Technical Bulletin No. P-128.

"AROCLORS as Co-Plasticizers for Polyvinylchloride"—Technical Bulletin No. P-131.

"AROCLORS as Used to Extend or Substitute Carnauba Wax"—Technical Bulletin No. P-132.

"AROCLOR 1254, Co-Plasticizer with DOP for Vinyl Organosols and Pastes"—Technical Bulletin No. P-134.

AROCLOR: Reg. U. S. Pat. Off.

Milmer 1-treated

Untreated

TROPICAL EXPOSURE TESTS PROVE PERMANENCE OF MILMER 1

Exceptional fungicide for canvas

Extensive tests at Harbel, Liberia, have demonstrated the unusual permanence of Milmer* 1 (Monsanto's Copper 8-Quinolinolate-T) as a fungicide for canvas goods, plastic-coated fabrics and awning striping paints. Subjected to the most adverse weathering conditions, Milmer 1-treated materials lost little of their tensile strength even when exposed for as long as six months. Untreated samples deteriorated almost completely.

In addition to its rot and mildew-resistant qualities, Milmer 1 is also characterized by extremely low toxicity to higher animals . . . Patch tests on 200 individuals show that the chemical is neither a skin irritant nor sensitizer.

Full data and samples of Milmer 1 will be sent promptly on request. It is recommended particularly for applications where color is not a primary consideration. **Reg. U. S. Pat. Off.*

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INDUSTRY'S BOOKSHELF

Coatings

PAINT AND VARNISH TECHNOLOGY, *edited by William von Fisher.* Reinhold Publishing Corporation, New York, 1948; 509 pp., $8.00. Reviewed by George M. Sutheim, Chief Chemist, Audio Devices Inc., New York.

THE TIMES of hit-and-miss procedures and closely guarded secret formulas in the paint and varnish industry are definitely over. It is no longer possible to select from the ever increasing flood of new synthetic raw materials without an intimate knowledge of their physical and chemical properties.

Here it is where the present book comes in as an excellent text. Edited by an expert in the field, who possesses the gift of balancing the contributions of 33 individual writers, a relatively small volume was created which covers the whole field of surface coatings in a thoroughly up-to-date fashion. Seventeen of its twenty-seven chapters are devoted to raw materials, with particular attention to modern techniques of modifying natural products and synthesizing high polymers. The rest of the book deals with such subjects as formulation, manufacture, sales, testing and application of surface coatings.

The book is well printed and richly illustrated. It can be recommended to students, as well as to practical men in the field who wish to brush up on the background of their every day work.

Engineering Math

THE MATHEMATICAL SOLUTION OF ENGINEERING PROBLEMS, *by Mario G. Salvadori* (with a collection of problems *by Kenneth S. Miller*). McGraw-Hill Book Co., New York; x + 245 pp., $3.50. Reviewed by D. S. Davis, Virginia Polytechnic Institute.

TO JUDGE from the alarming rapidity with which engineering graduates lose facility in applying mathematical methods, it would appear advantageous to offer, in the senior year, a "booster" course in engineering mathematics. Such a course might well be built around the present book, which has been thoroughly tried out, in Mimeographed form, at Columbia University.

The book opens, wisely, with two chapters of a review nature. The first gives an exceptionally lucid account of basic concepts, starting with natural numbers, that are amply illustrated and firmly clinched with nearly one hundred well-chosen problems. The second covers the essentials of plane analytical geometry in a competent manner. Thereafter the authors pass on to practical methods for solving algebraic and transcendental equations and furnish the student with a generous collection of nonacademic problems. Further chapters discuss determinants and series capably and in gratifying detail.

The presentation is clear throughout and the illustrations used in connection with imaginary numbers and discontinuous functions are sure to appeal to the student and stand him in good stead. Answers are given to about two-thirds of the 380 problems.

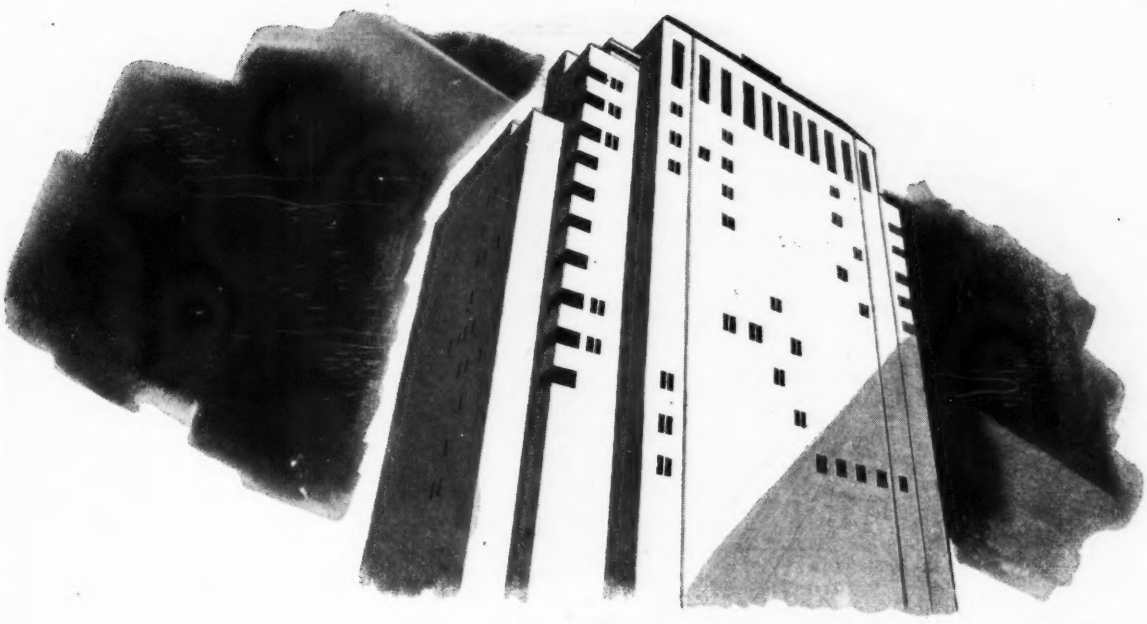
Seeking dutifully for something with which to appear dissatisfied, your reviewer can only suggest, without much real conviction, that more problems in the fields of chemistry and chemical engineering might accompany those of interest to mechanical and electrical engineers and physicists. The paper is heavy and bright; wide prewar margins are back again and the indexing is adequate. The book, a distinct credit to authors and publisher, should find ready acceptance in engineering schools and should be welcomed by graduate engineers who wish to refresh themselves in mathematical techniques.

Polymers

PRINCIPLES OF HIGH-POLYMER THEORY AND PRACTICE, *by Alois X. Schmidt and Charles A. Marlies.* McGraw-Hill Book Co., New York, 1948; 743 pp., $7.50. Reviewed by Wm. P. Utermohlen, Jr., Research Chemist, Institute of Textile Technology.

THIS book presents the principles of high polymer theory and practice in an exceptionally well balanced and coordinated fashion. The book is designed for graduate and advanced undergraduate instruction, but appears of great potential value to scientists working in polymer fields. Its greatest merits are the broad treatment of polymers from the viewpoints of chemistry, physics and engineering, and the sound treatment of polymer properties as related to uses.

Theoretical aspects of high polymers are given a breadth and thoroughness of treatment which appear well suited to the needs of today's students. At the same time an easily readable style is maintained. Chapters emphasizing theory comprise a large proportion of the first half of the book and treat such subjects as molecular forces, chemical and mechanical behaviors and polymer properties.



A Monument to Finer Living...

Glenn McCarthy
. . . oil wildcatter, sportsman, airman . . . head of 16 corporations and organizations, member of 14 more . . . oilman builder of McCarthy Center (1100-room hotel, 1200-car garage, 1750-seat theater, swimming pool, exhibition hall).

In the priceless book of man's memory there shines in illuminated lettering the magic word, "Hospitality." As a city of importance, Houston ranks peak-high on the scale . . . as a city of hospitality, Houston reigns among the nation's friendliest.

And now may we present The Shamrock . . . hotel spectacular . . . symbol of hospitality in one of America's most hospitable cities. From its very beginning this was no ordinary hotel, for wound inextricably in the substances of its creation are the ambitious materials of a young man's dream.

Yes, native Texan Glenn McCarthy fulfilled a dream for Houston, built for Houston a magnificent structure of stone and steel as a small measure of esteem for the bounties the city . . . and the state . . . had tendered him through hard years of striving.

And so you see The Shamrock, Glenn McCarthy's contribution to Houston and to finer living . . . rising tall above Lone Star plains as a great monument to warm hospitality.

The eyes of Texas and of the entire nation are on Houston's . . . The Shamrock.

GRAND OPENING • ST. PATRICK'S DAY • MARCH 17, 1949

In Houston, you are cordially invited to live at

The Shamrock

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polymer formation and modification, polymer structure, and rheology. These are so written that the more advanced material may be by-passed at the instructor's wish without sacrifice of continuity. High-polymer practice is treated in chapters on molding and manipulating, fibers and fibrous products, rubbers, surface coatings, and adhesives.

The mechanical features of the book—press work and typography, binding, chemical formulas, table organization, etc.—are uniformly high quality. References to literature are thorough, up-to-date and well organized, being listed both at the ends of appropriate chapters and (more broadly) in an appendix. A careful index and a number of useful appendices on polymer properties, formulas and names complete the book.

The organization of subject matter by properties or application of polymers does not permit a complete, collected coverage of any given type of polymer in one place. Styrene, for example, is the subject of over thirty index references, scattered throughout the whole book. This treatment gives a better understanding of the underlying phenomena and interrelation of polymers, at the expense of descriptive and factual treatments of the industrial preparation and processing of particular polymers.

The reviewer has found the first group of graduate students using this book to be quite enthusiastic about it as a text for a course in polymers.

Organic Syntheses

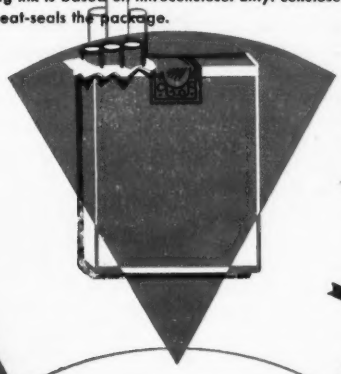
ORGANIC SYNTHESES, VOLUME 28, *H. R. Snyder, editor-in-chief*. John Wiley & Sons, Inc., New York, 1948; 121 pp., $2.50. Reviewed by D. C. England, E. I. du Pont de Nemours & Co.

THIRTY-SEVEN interesting organic preparations, including twelve developed under government sponsorship during the war, appear in this volume of "Organic Syntheses." They are as follows: 2-acetothienone, 2-acetylfluorene, 9-acetylphenanthrene, 2-allylcyclohexanone, *o*-aminobenzaldehyde, *p*-aminophenyl disulfide, benzoyl disulfide, 9-bromophenanthrene, 4-bromo-*o*-xylene, 3-carbethoxycoumarin, p-chloroacetylacetanilide, *m*-chlorophenylmethylcarbinol, m-chlorostyrene, 9-cyanophenanthrene, trans-1,2-cyclohexanediol, 4,7-dichloroquinoline, 2,5-dihydroxyacetophenone, diisovalerylmethane, 3,4-dimethylaniline, 2,4-dimethylquinoline, 1,4-dinitronaphthalene, diphenylacetonitrile, ethyl azodicarboxylate, ethyl ethoxymethylenemalonate, fluorenone-2-carboxylic acid, hexamethylene chlorohydrin, hydroquinone diacetate, 2-hydroxycinchoninic acid, *dl*-isopropylideneglycerol, methyl 4-keto-7-methyloctanoate, 4-nitro-1-naphthylamine, p-nitrophenyl sulfide, phenanthrene-9-aldehyde, 1-phenyl-3-amino-5-pyrazolone, α-phenylthiourea, 2,4,7-trinitrofluorenone, and vinyl chloroacetate. The

Revolutionizing Cigarette Packaging . . .

New packages for cigarettes do away with conventional three or four wraps, seal in freshness, seal out moisture with a single wrap of foil-paper lamination developed by Reynolds Metals Co.

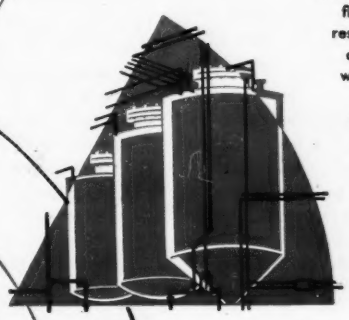
Two Hercules products help make this possible. Nitrocellulose combines with ethyl cellulose to give moisture resistance and durability to the transparent lacquer overcoat. The quick-dry type rotogravure printing ink is based on nitrocellulose. Ethyl cellulose also heat-seals the package.



Anti-Corrosion Coatings . . .

Corrosion—costliest of all chemical plant maintenance factors—is now being checked successfully with paints based on Hercules Chlorinated Rubber (Parlon*). These finishes have exceptionally high resistance to most acids, alkalies, and salts. They adhere equally well to metal, wood, concrete—even under adverse humidity conditions. They dry overnight.

Parlon-base paints find wide use in textile mills, chemical processing plants, sewage disposal plants, paper mills, and wherever moisture or chemical corrosion present a major problem.



Low-Cost Shellac Substitute . . .

One of the many money-saving uses for Hercules Vinsol* Resin is as a partial or complete replacement for shellac. Low in price, and available in quantity, Vinsol can readily substitute for shellac in many applications.

Vinsol is a dark-colored thermoplastic resin with a high melting point (234 to 239° F). It is only slightly soluble in most petroleum solvents, but completely soluble in alcohols, ketones, and esters. It is supplied in lumps, flakes, pulverized, or as a stable emulsion.

*Reg. U. S. Pat. Off.

Can you profit from these or other Hercules Chemical materials?

The products briefly described here are but a small segment of Hercules' broad range of chemical materials for the process industries. Return coupon for technical details or samples of those materials in which you are interested.

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992 Market Street, Wilmington 99, Del.

Send technical data ☐ testing sample ☐ of

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cumulative index comprises material from volumes 20 through 28.

Of the thirteen liquid products, refractive indices are given for nine: four at 20° C., four at 25° C. and one at 22° C. It is felt that a range of refractive indices, preferably at a standard temperature, would be a useful corollary to boiling point data in describing purity of liquid products. This volume represents a valuable addition to a series indispensable to the organic chemist's library.

Research

THE GENIUS OF INDUSTRIAL RESEARCH, *by D. H. Killefer.* Reinhold Publishing Co., New York, 1948; 264 pp., $4.50. Reviewed by E. W. Cook, American Cyanamid Co.

THIS is an excellently written book covering the case histories of many successful industrial researches. These case histories are interpreted and are offered as examples to guide the research worker, since little or no training on research methods is given to the college student. Many of the cases are taken from researches leading to the coveted Perkin Medal, and extensive quotations are taken from the addresses of the Perkin Medalists. All of these cases are interestingly presented and include such discoveries or inventions as lead tetraethyl, Neoprene synthetic rubber, Freon refrigerants, rubber accelerators, electric precipitators, sound absorbent materials, synthetic vitamin B_1, aluminum metallurgy, aluminum and nickel electroplating, argon manufacture, catalytic hydrogenation, fat splitting, carbon and tungsten filaments for the incandescent lamp, disproportionated rosin soaps, isoprene manufacture, recovery of Searles Lake salt deposits, nitrocellulose lacquers, lacquer solvents, celluloid, desulfurizing petroleum, and thermal cracking of petroleum. The presentation of so many successful case histories with the mention of so few researches that met with negative results might tend to give the beginner in research the impression that modern industrial research is easy and comes somewhat by magic.

The author discusses the dual nature of research, whether fundamental or applied, and describes the two basic methods of research: one method based primarily on experimentation as practiced by Bacon and Edison; the other method based on theorizing and deductive reasoning as championed by Aristotle and later by Bancroft. Although both of these methods have been used to carry out research, and successful examples of each are given, a judicious combination of the two methods is preferred and recommended.

The importance of clearly stating the research problem is emphasized as well as the need for writing concise reports, an ability which seems to be so universally lacking in most technical personnel. The researcher is urged to keep accurate research records, preferably in running-diary form for patent purposes.

Process development, product research, equipment research, pilot-plant functions and procedures, and, surprisingly enough, the rather difficult subject of evaluating research are all discussed in separate chapters. However, the question of research organization and management is purposely not included since this is too large a subject in itself.

The history of the early development of synthetic rubber in Germany and England is given to show how an idea grows and proceeds successively through the test-tube stage in the research laboratory, on to the pilot plant, and finally after somewhat disappointing field trials, is put into plant production under the stress of World War I.

The idea of research by teams is touched on briefly, and an example is included under the development of aluminum electroplating to show how greater the chance of success is in a cooperative organization since rarely does one individual have sufficient fundamental information to cover all the points of a problem. When a research problem is hotly pursued, it is usually the large organization with its unlimited resources and the many skills of the research team that solves the problem first.

Although no formal bibliography is attempted, at the end is a list of some of the references from which quotations were made, particularly such source materials as the "Harvard Classics," "Discovery," and "The Practical Cogitator."

Physical Texts

OUTLINES OF PHYSICAL CHEMISTRY, *by Farrington Daniels.* John Wiley and Sons, Inc., New York; Chapman and Hall, Ltd, London, 1948; vi + 713 pp., $5.00. Reviewed by Scott E. Wood, Illinois Institute of Technology.

THE FIRST edition of "Outlines of Physical Chemistry", by Frederick H. Getman was published in 1913. After four revisions, Prof. Farrington Daniels took the responsibility of revising the book and the first edition of the well-known book by Getman and Daniels appeared in 1931. The three succeeding editions by Prof. Daniels have now resulted in the present book, which is published under the sole authorship of Prof. Daniels. As such it could be considered as the first edition of a new book.

The subject matter and method of presentation are in general the same as in the previous editions. Numerous sections have been completely rewritten for clarification of the text and the introduction of new material. Among the changes noted by the reviewer were discussions of the electron microscope and of chromatographic absorption, greater use of fugacities and activities in the chapter on chemical equilibria, and an introduction to the concept of energy of activation. The signs of the electrode potentials have been changed to conform to popular usage. Probably the greatest revision occurs in the last chapter where the subject of nuclear reactions and of nuclear fission is introduced.. An extensive table of stable and unstable isotopes is included. Further, actual data have been used in drawing the illustrative figures wherever possible throughout the book rather than simply showing the general behavior by a hypo-

Would you be in this line-up?

If executives who have suffered losses because of package and contents damaged in transit could recoup them at a window like this, the line would extend around and around the block.

But it would be hard to find a single man in line who packed his product in metal containers.

Cans protect.

AMERICAN CAN COMPANY

New York • Chicago • San Francisco

This trademark CANCO *is your assurance of quality containers. Look for it!*

Other advantages of the can

1. **Cans are break-proof.**
2. **Cans protect contents against light, air, insects, and moisture.**
3. **Cans are *light*—mean lower shipping costs. *Compact*—mean more storage and display space.**
4. **Cans mean eye-appeal for impulse buying.**
5. **Cans are tamper-proof.**
6. **Cans are easy to open and dispose of.**

thetical diagram. Many new problems have been added or substituted for older problems.

The order of the chapters is generally the same, but a few changes have been made. A new chapter on Atomic and Molecular Forces now appears as Chapter III, the chapter on Colloids is placed after Ionic Equilibria, and the former chapter on Chemical Thermodynamics is omitted as such although the subject matter is incorporated in other chapters. As mentioned earlier the last two chapters on Atomic Structure and Molecular Structure have been completely changed, incorporating some of the material in other chapters and adding the material dealing with nuclear structure, to give one chapter on Atomic and Nuclear Structure.

The quality of the former editions has certainly been maintained, if not improved, in the present book, and Daniels. rather than Getman and Daniels, will continue to be used in a large number of courses in physical chemistry.

Other Publications

RESEARCH INFORMATION SERVICE, 509 Fifth Ave., New York 17, N. Y., is distributing catalogs giving prices of its translations from the Russian technical literature. Bulletin No. 27, dealing with petroleum, and No. 29, dealing with chemistry, are available free of charge.

A.S.T.M. SPECIFICATIONS FOR STEEL PIPING MATERIALS. 330 pp., $3.00 A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa.

SCIENTIFIC GLASS BLOWING AND LABORATORY TECHNIQUES by W. E. Barr and Victor J. Anhorn, Gulf Research and Development Co. This book, containing 388 pages and 212 illustrations, is designed to teach the experimentalist to perform simple glass blowing operations himself and also to aid him in designing complex equipment more intelligently. Domestic, $6.00, Foreign, $6.50, Instruments Publishing Co., Inc., 1117 Wolfendale St., Pittsburgh, Pa.

ENGINEERING WITH RUBBER, edited by Walter E. Burton in collaboration with engineers and research men of B. F. Goodrich Co., deals with industrial rubber products and their applications to industrial uses. 468 pp., $6.50, McGraw-Hill Book Co.

A. S. T. M. STANDARDS ON PAPER AND PAPER PRODUCTS, fourth ed., 286 pp., $2.50. A. S. T. M. Headquarters, 1916 Race St., Philadelphia, Pa.

NEW PRODUCTS is an 80-page compilation of the innovations of more than 750 different manufacturers in 60 different industries. $0.50, New York Journal of Commerce, 63 Park Row, New York, N. Y.

DIRECTORY OF AMERICAN COUNCIL OF COMMERCIAL LABORATORIES is a 36-page compilation listing the services available from the member laboratories. Available free of charge from the Executive Secretary, A. J. Nydick, 225 Broadway, New York 7, N. Y.

PRINCIPLES AND PRACTICE OF FLOW METER ENGINEERING, sixth ed., is available at $3.00 per copy from The Foxboro Co., Foxboro, Mass.

BUSINESS ESTABLISHMENTS, EMPLOYMENT AND TAXABLE PAYROLLS is an invaluable guide to the present and potential market for consumer and industrial goods in continental United States, Alaska and Hawaii. The series consists of one summary report for the United States and one each from the 48 states, the District of Columbia, Hawaii, and Alaska. They are available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. or from Department of Commerce field offices at prices ranging from 5c to 40c for single reports or $7.00 for the complete set of 51 reports.

INDUSTRIAL HEALTH DEPARTMENT FUNCTIONS AND RELATIONSHIPS is a two-year national survey of industry's facilities and activities for protecting the health of its workers. It will be of interest to the medical department of chemical companies. 98 pp., $2.00, Industrial Hygiene Foundation, 4400 Fifth Ave., Pittsburgh 13, Pa.

1949 DIRECTORY OF OCCUPATIONAL SAFETY POSTERS, prepared by the National Safety Council. A 72-page directory containing 744 illustrations of 2, 3, and 4-color posters ranging from letterhead size to 10′ x 12′. $0.50, National Safety Council, 20 North Wacker Drive, Chicago 6, Ill.

ECONOMIC NEWS FROM GERMANY, a weekly bulletin on current economic developments in occupied Germany. Edited by Karl G. Gehnich, Stockholm, Sweden. Available in this country from International News Co., 131 Varick St., New York 13, N. Y. It is delivered by air mail, $10 for 3 months, $17 for 6 months, and $30 per year. It is published in English.

SCIENTIFIC AND TECHNICAL ABBREVIATIONS, SIGNS AND SYMBOLS by O. T. Zimmerman and Irvin Lavine. The authors have brought together thousands of abbreviations, signs, and symbols of scientific and technical terms in numerous fields, and thousands of important graphical symbols used in preparing drawings charts, and maps. 476 pp., $7.50, Industrial Research Service, Masonic Bldg., Dover, New Hampshire.

New Products & Processes

(Continued from Page 436)

Oil-Soluble Quaternaries NP 872

Quaternary ammonium compounds with two long-chain alkyl groups are oil-soluble.

Soluble in organic solvents but still dispersible in water are two quaternary ammonium compounds, developed by Armour & Co., that contain two long-chain alkyl radicals per molecule. They are dialkyl dimethyl ammonium chlorides in which the alkyl groups range from 8 to 18 C atoms.

Arquad 2C and Arquad 2HT, as the materials are called, are suggested for emulsification, softening textiles, increasing dye substantivity, mold inhibition, and as germicides.

Peelable Coating NP 873

Lower cost is claimed for new strippable protective coating.

Chemclean Products Corp. has developed a new strippable protective coating which has a variety of useful aplications in metal products manufacturing plants.

This material, called Chem-Peel, is a plastic emulsion that can be applied either by spraying or dipping, and imparts to the surfaces so treated a film of plastic which can easily be removed by simply peeling it off.

Chem-Peel, which has the properties of various similar materials is claimed to be relatively non-toxic, non-flammable, and approximately 40% less expensive than the materials now generally sold for this purpose.

Plating-Rack Coating NP 874

Vinyl plastisol gives faster build-up of coating on plating racks.

Hanson-Van Winkle-Munning Co. has developed Kote-Rax Grade K, a superior rack coating designed to insulate and protect plating racks and fixtures in all types of electroplating and anodizing solutions. This formulation has excellent chemical resistance and is free from any tendency

KELCO ALGIN ...

ITS USES ARE Many and Varied

★ FOOD PRODUCTS

ICE CREAM
SHERBETS AND ICES
COTTAGE CHEESE
CREAM CHEESE
CHEESE SPREADS
SALAD DRESSING
FLAVOR EMULSIONS
MEAT SAUCES
CANDY GELS
BAKERY ICINGS
TOPPINGS
MERINGUES
PIE FILLINGS
BAKERY GLAZES
JELLIES AND SYRUPS

★ PHARMACEUTICALS and COSMETICS

EMULSIONS AND SUSPENSIONS
JELLIES AND OINTMENTS
SHAMPOOS
TOOTHPASTE
SHAVING CREAMS
HAND LOTIONS AND CREAMS
DENTAL IMPRESSION COMPOUNDS

★ INDUSTRIAL

PAPER COATINGS
PAPER SIZING
TEXTILE PRINTING PASTE
WATER-THINNED PAINTS
ADHESIVES
CERAMIC GLAZES
BOILER COMPOUNDS
CLEANING COMPOUNDS
DETERGENTS
LATEX CREAMING AND THICKENING
LEATHER FINISHING COMPOUNDS
FIRE RETARDING COMPOUNDS

• Kelco Algin, because of its unique and effective colloidal properties, has won widespread preference in many industries as a superior stabilizing, thickening, suspending, emulsifying, gel-producing, film-forming and adhesive agent.

It will pay you to find out how Kelco Algin can be profitably used to meet your particular requirements. For complete information write to our nearest regional office.

KELCO REG. U.S. PAT. OFF. REFINED ALGIN PRODUCTS

KELCO COMPANY

20 N. Wacker Drive
CHICAGO—6

31 Nassau Street
NEW YORK—5

530 W. Sixth Street
LOS ANGELES—14

Cable Address: KELCOALGIN—New York

to introduce organic impurities into bright plating solutions.

The application procedure is rapid and simple. Because Kote-Rax, Grade K is 100% solids whereas other materials are often as high as 90% in solvent content, only two dips are required to obtain a final coating which is equivalent to ten or more dips of other solvent-dispersed vinyl materials. This new rack coating is a plastisol.

Glyceryl Mono-oleates NP 875

New process gives better color in glyceryl mono-oleate manufacture.

Glyceryl mono-oleates are now being produced by a new process. This process makes possible the production of lighter-colored and more highly surface-active materials at lower cost.

Two grades of the new glyceryl mono-oleates are now being manufactured by Glyco Products Co., Inc. Both are edible and light yellow liquids. One grade is water dispersible and soluble in alcohols and oils, and is a powerful oil-in-water emulsifier. The other grade is insoluble in water and soluble in alcohols and oils.

Aluminum Finish NP 876

Brightening process for aluminum reduces or eliminates polishing.

Chemlustre, a new finish for aluminum, has been developed by Chemclean Products Corp.

By the elimination of many expensive wheel operations, this process makes it possible to produce a variety of work which was formerly impracticable because of excessive costs.

The material involved in the Chemluster process is an alkaline combination, white and crystalline in appearance. It is used in ordinary steel equipment, preferably with an exhaust system similar to that used in chromium plating.

Conductive Glass NP 877

Conducting coating for glass generates electrical heat.

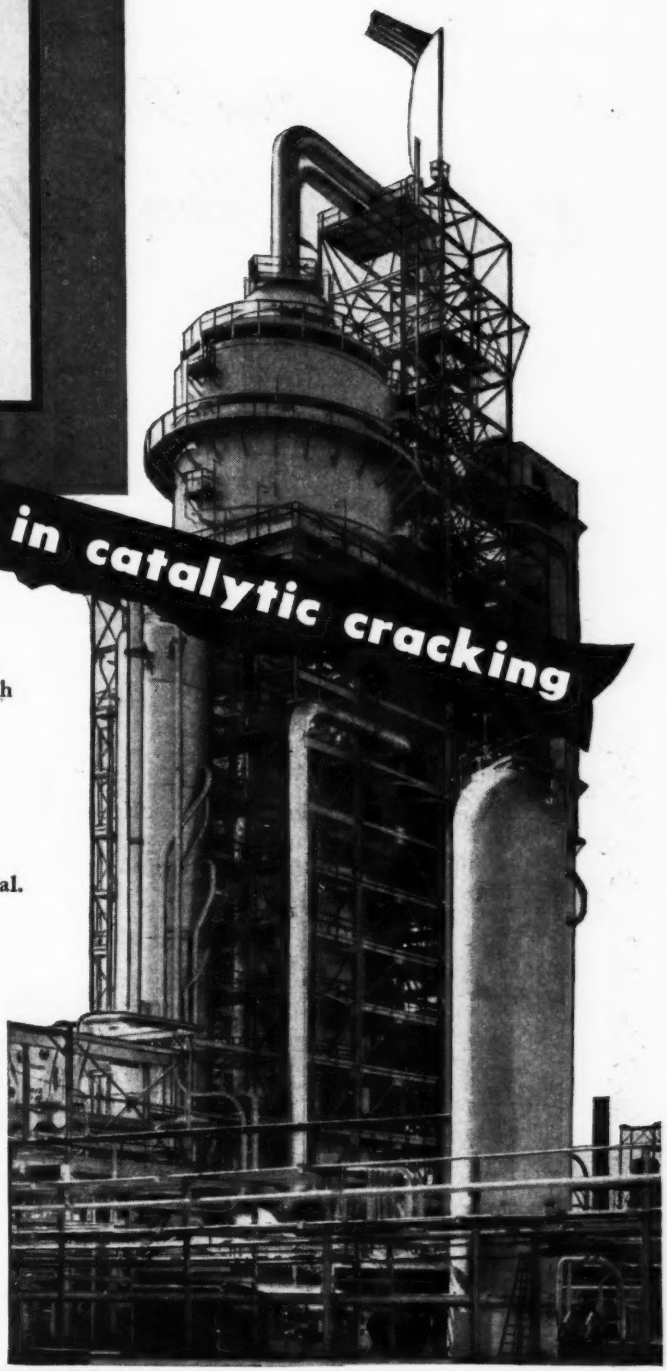
Glass coffee makers which require no stove or hot plate have been made possible by the development of new electrically-conductive coatings for glass by Corning Glass Works.

The coatings are thin and transparent but extremely tough and tenacious; they can be varied to produce any desired electrical resistance from 10 to 10,000 ohms. An electric current passing through such a coating generates heat in the same way as electricity heats the coils in an electric toaster or iron.

Possible applications are for radiant heaters, coffee makers, heat interchangers, and defrosters. Development efforts are now being concentrated on some of these items that have large potential volume.

DA-1

big operator in catalytic cracking



DA-1*—Davison (Synthetic Silica Alumina) Fluid Cracking Catalyst — contributes yearly to the production of enough gasoline to drive every one of America's 34,000,000 passenger cars 800 miles.

Close laboratory control over the production of DA-1 assures its users of a consistently uniform high standard material.

To meet the varied requirements of the refinery operators, DA-1 is available in three grades:

F-1, Fine Grind

C-1, Intermediate Grind

C-2, Coarse Grind

Write for information and specifications.

*®

THE DAVISON CHEMICAL CORPORATION

Progress through Chemistry

BALTIMORE-3, MD.

NEWS OF THE MONTH

Mathieson Chemical Corp. has contracted to purchase Southern Acid & Sulphur Co., Inc., for 265,000 shares of its common stock to be distributed to the common stockholders of Southern Acid & Sulphur.

Principal business of Southern Acid is production and sale of sulfuric acid, ammonium phosphate, ammonium sulfate, phosphoric acid, superphosphates, mixed fertilizers and sulfur. Its plants are located at Houston, Beaumont, Port Arthur, Tex.; Shreveport, La., and Little Rock, McKamie, Macedonia, Ark. Net sales of the company in 1948 totaled $21.8 million, yielding a net profit of about $2.62 million.

In addition to acquiring a business producing satisfactory earnings, the move will further diversify the line of basic chemicals now manufactured by Mathieson. Mathieson stockholders authorized an increase in the common stock of the corporation from 1 million to 1.5 million shares to finance the expansion.

R. L. Murray, elected executive vice president of Hooker Electrochemical Co. He has been vice president in charge of development and research.

The Dow Chemical Co. has completed new facilities expanding its phenol capacity by 30 million pounds, and now has the new plant in production. Dow, which instituted synthetic phenol manufacture in this country in 1915, has long been a top supplier of this chemical.

American Viscose Corp. plans to expand its Sylvania cellophane production at its Fredericksburg, Va., plant to 100,000 lbs. a year. This expansion will double the present production of Sylvania cellophane and make the Fredericksburg plant the largest cellophane plant in the world. Increased production will be achieved as soon as the necessary equipment can be procured and installed.

Chemical Plants Division of Blaw-Knox Co. is the contractor for the new 250-ton-per-day soybean solvent extraction plant being built by The Glidden Co. at Indianapolis, Ind. The project, reported to cost an estimated $3 million, is to be ready in time to process the 1949 fall crop of soybeans.

Another such plant also being constructed by the company is the 200-ton-per-day soybean extraction plant of the Soyafeed and Oil Corp. at East St. Louis, Ill. The Blaw-Knox award for this unit, also scheduled to handle the fall crop, is approximately $750,000.

Production of caustic soda and chlorine at the Edgewood Arsenal plant of the Diamond Alkali Co. will be stepped up approximately 30 per cent by expansion of facilities to be completed by early spring. This is the first expansion undertaken at this site since extension to 1967 of the lease originally granted the company by the government in 1946.

Colgate-Palmolive-Peet Corp. is constructing additional facilities at its Kansas City, Mo., plant. This construction, expected to be finished before the end of the year, will make possible production of a line of toilet goods not previously made at that location.

The various Shell companies have earmarked a record $24 million budget for worldwide petroleum research during 1949. The sum will finance research in all phases of operations, from seeking new sources of crude oil to improving fuels, lubricants and chemicals. The Emeryville, Cal., laboratories of the Shell Development Co., engaged in broad basic research, will play a substantial role in this program.

Aviation and agriculture will be stressed, with fuels and lubricants for jet engines to get increased attention in 1949. The world food supply crisis gives top priority to agricultural projects.

Basic Refractories, Inc., Cleveland, Ohio, has purchased the Government-owned property, buildings and equipment of the former Basic Magnesium, Inc., plant at Gabbs, Nevada, as approved by War Assets Administration. The estimated price was $625,000. The purchasing company is the parent concern of the wartime Basic Magnesium, Inc. Basic Refractories is expected to convert the property to production of magnesia refractories, with production scheduled to start in July.

Russell F. Dixon, elected to the board of directors of the William D. Neuberg Co., Inc.

Test runs were recently started at the now completed Hilton-Davis, Cincinnati plant for production of beta naphthol, important intermediate for organic colors and dyes. The new plant, which makes Hilton-Davis one of the three major manufacturers of beta naphthol in the U. S., should be in routine operation by early April.

Greater fertilizer production for the West and Middle West is the aim of new Department of Interior regulations covering exploration, development and production of phosphate deposits in Western public lands.

The development will be left in the hands of private companies through two types of licenses: (1) "non-competitive" to promote exploration and discovery in unexplored areas and (2) "competitive" to promote development and production in areas of known deposits. The Government will receive rent and royalties on resultant production.

The first post-war mercury power plant equipment unit has been placed in operation in the South Meadow Station of the Hartford Electric Light Co., Hartford, Conn.

Designed and supplied by General Electric, the equipment uses mercury vapor at 113 p.s.i.g. at 945° F. to drive a mercury turbine at 720 r.p.m. The unit generates 15,000 kw. while also supplying about 200,000 pounds of steam per hour

at 400 p.s.i.g. at 700° F. to drive existing steam turbines.

Electro Refractories & Alloys Corp. is now producing crude lump silicon carbide abrasives and refractories at Cap de la Madeleine, Quebec, for consumption at the parent plant in Buffalo, N. Y. The old Tidewater Shipbuilding Co. was purchased last spring for this purpose, and the electric furnace plant that has been constructed went into operation early this year.

The average chemical company must operate at 80% of capacity today to stay out of the red, as contrasted to the prewar break-even point of 50% of capacity, according to R. S. Aries, Polytechnic Institute of Brooklyn, who spoke before the Chemical Market Research Association at the Biltmore Hotel, New York City, last month. High wartime and postwar plant investment as well as high labor and materials costs were given as the reasons for the change.

American Latex Products Corp., Los Angeles, Cal., has begun construction on a three-unit group of new factory and general office buildings at Lawndale, Cal. Cost will be in excess of $250,000 and completion is scheduled for the latter part of May. The new plant will materially increase the company's manufacturing capacity and permit larger stocks and expansion of its lines.

McCarthy Chemical Co., a wholly-owned subsidiary of McCarthy Oil & Gas Corp., has sold to the Metropolitan Life Insurance Co. $15 million of 4 per cent 10-year first mortgage bonds. Proceeds from the sale of the bonds will be used to repay advances made by the parent company to construct chemical plants and for related facilities, and to provide working capital.

The Emulsol Corp., Chicago, has broken ground on a new addition to the organic chemical plant at Kilbourn Ave., Chicago, that will cost approximately $150,000. It will be used for warehouse space and possibly later for additional manufacturing facilities.

The company recently appointed the Hukill Chemical Co., Cleveland, Ohio, as sales representative of its surface-active chemicals in Ohio and western Pennsylvania.

Six Indian engineers employed by the Indian Government are in this country for an extended period of intensive training in the operation, maintenance and production phases of fertilizer plants of the American Cyanamid Co. in North America. At the end of their training period these men will return to India to take over operation of a new $50 million fertilizer plant (300,000 long tons of ammonium sulfate fertilizer per year) at Sindri. The plant was engineered by Chemical Construction Corp., a unit of American Cyanamid Co., and is being run by its engineers until the Indian engineers can take over.

J. C. Macon, Jr., appointed sales manager, Tar Products Division, Koppers Co., Inc. He has been with the company since 1935.

Devoe & Raynolds Co., Inc., which has acquired the Bishop-Conklin Co., of Los Angeles, will use it as a nucleus for further development on the West Coast, and is building a synthetic resins plant on the property recently acquired there. It is also making some general improvements to machinery and equipment to take care of increased production. These improvements are not expected to exceed $300,000 in cost.

The synthetic fuels program will be pushed this year, with a request for $450 million for the purpose pending in Congress. A similar request at the previous session failed. As the bill is now written, construction of plants can be either by the government or by private interests financed by government loans.

Total stock interest of the Carlisle Chemical Works, Inc., manufacturers of oil additives and industrial organic chemicals, has been acquired by The Cincinnati Milling Machine Co. No change in personnel is contemplated. As a result of this affiliation, Carlisle expects to acquire extensive testing facilities, as well as to increase its research and development activities and plant facilities.

Employees of the Monsanto Chemical Co. at the Monsanto, Tenn., plant and of Shawinigan Resins Corp., an associate company of Monsanto manufacturing plastics intermediates at Springfield, Mass., have won company trophies for their 1948 safety records. The Monsanto, Tenn., plant operated 1,133,167

man hours in 1948 with only two lost-time accidents for a 1.76 accident frequency, and Shawinigan Resins operated the entire year without a lost-time accident, compiling 625,209 man hours.

Binney & Smith Co. International has been formed as a wholly-owned subsidiary of Binney & Smith Co. to handle its expanding worldwide operations in serving the rubber, paint and ink industries with materials and machinery.

Elgin Softener Corp., Elgin, Ill., and Illinois Water Treatment Co., Rockford, Ill., have joined forces to effect more complete water service at a minimum cost. Each company will maintain its name identity and personnel, but will consolidate manufacturing operations and integrate services.

The Laminating Division and the Adhesives Division of the Thermosetting Department of the Bakelite Corp., have been consolidated. This division will be known as the Laminating and Adhesives Division.

Glyco Products Co., Inc., has finally transferred all its Brooklyn manufacturing and research facilities to its main plant at Natrium, W. Va. Consolidation has resulted in more efficient and economical production because of the more central location.

Monsanto Chemical Company has consolidated its two Los Angeles sales offices at one location, 714 W. Olympic Blvd. The new office will handle sales of chemicals, plastics, adhesives and coatings.

American Cyanamid Co. has formed a New Product Development Department, with George W. Russell as manager. The department will be concerned with potential sales applications for products developed in Cyanamid's research laboratories, and market research on currently manufactured products.

Lion Oil Company directors have proposed amending the company's articles of incorporation in order to increase the authorized capital stock to 5 million shares without nominal or par value, and split the outstanding stock on the basis of 2 shares for each outstanding one. This proposal will be submitted to stockholders at a meeting to be held April 12, 1949.

The Chicago office of Witco Chemical Co. has been transferred to the Lincoln Tower, 75 E. Wacker Drive.

The Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., and the International Chemical Workers Union, Local 111, A. F. of L., have signed a new agreement marking the eighth consecutive year negotiations have been carried out successfully through collective bargaining. The agreement increases hourly rates 9 cents an hour, increases afternoon and night shift differentials and grants additional hourly premium for Saturday and Sunday work.

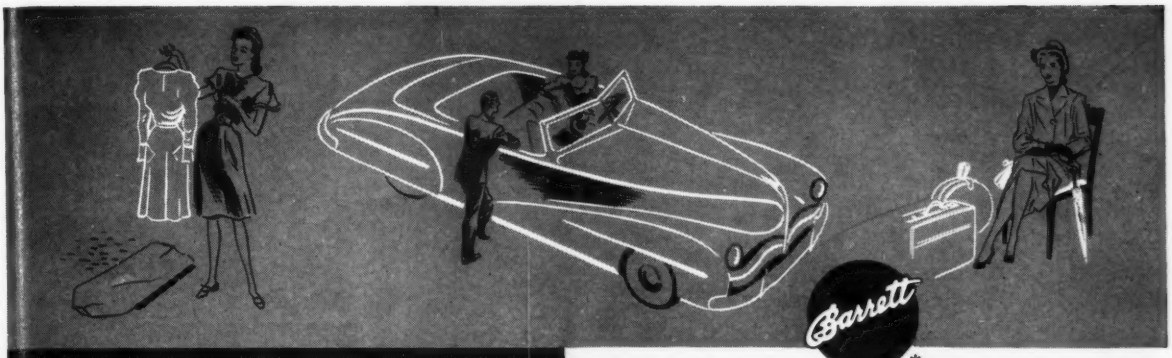
CALENDAR *of* EVENTS

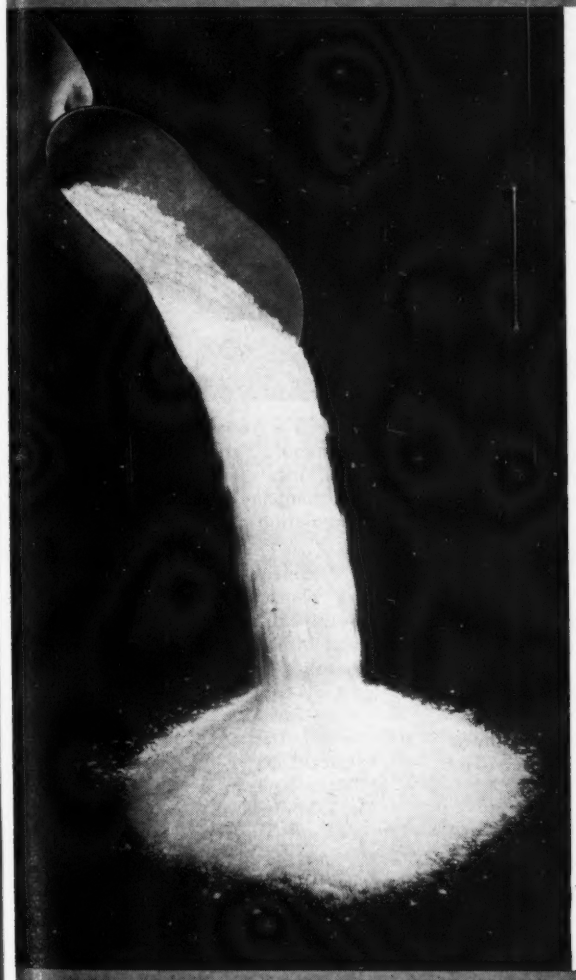
AMERICAN ASSOCIATION OF CEREAL CHEMISTS, national convention, New York City, May 15-19.
AMERICAN CERAMIC SOCIETY, 51st annual meeting, Cincinnati, Ohio, April 24-28.
AMERICAN CHEMICAL SOCIETY, 115th national meeting, San Francisco, March 27-April 1.
AMERICAN GAS ASSOCIATION, production and chemical conference, Hotel New Yorker, New York City, May 23-25.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Tulsa, Okla., May 8-12.
AMERICAN INSTITUTE OF CHEMISTS, annual meeting, Edgewater Beach Hotel, Chicago, May 6-7.
AMERICAN MANAGEMENT ASSOCIATION, national packaging exposition, Auditorium, Atlantic City, N. J., May 10-13.
AMERICAN OIL CHEMISTS' SOCIETY, 40th annual meeting, Roosevelt Hotel, New Orleans, May 10-12.
AMERICAN PHARMACEUTICAL ASSOCIATION, annual meeting, Jacksonville, Fla., April 24-30.
AMERICAN SOCIETY FOR METALS, Western metal show, Los Angeles, April 11-17.
ELECTROCHEMICAL SOCIETY, INC., 95th convention, Benjamin Franklin Hotel, Philadelphia, Pa., May 4-7.
FOREST PRODUCTS RESEARCH SOCIETY, 3rd annual national meeting, Civic Auditorium, Grand Rapids, Mich., May 2-4.
INSTRUMENT SOCIETY OF AMERICA, 4th annual spring meeting, Royal York Hotel, Toronto, Canada, May 12-13.
METAL POWDER ASSOCIATION, 5th annual spring meeting, Drake Hotel, Chicago, April 5-6.
NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual conference and exhibition, Netherland-Plaza Hotel, Cincinnati, Ohio, April 11-14.
PACKAGING MACHINERY MANUFACTURERS INSTITUTE, semi-annual meeting, Hotel Dennis, Atlantic City, N. J., May 9.
SECOND PACIFIC CHEMICAL EXPOSITION, San Francisco, Nov. 1-5.
SCIENTIFIC APPARATUS MAKERS ASSOCIATION, annual meeting, Atlantic City, N. J., April 25-27.
SOCIETY OF THE PLASTICS INDUSTRY, Pacific Coast Sec., 6th annual spring meeting, Biltmore Hotel, Santa Barbara, Cal., March 17-19.
TWENTY-SECOND EXPOSITION OF CHEMICAL INDUSTRIES, Grand Central Palace, New York City, Nov. 28-Dec. 3.

Henry A. Gardner Laboratory, Inc., Bethesda, Md., has run several laboratory and lecture courses on "Appearance and Its Measurement" at its laboratory. The company intends to form similar courses in the future for those in industry interested in measurement of gloss, reflectance, color, etc.

Chemists and engineers of the Standard Oil Co. (Indiana) have formed a new organization, the Whiting Science Club, designed to broaden the technical background of its members through addresses by eminent authorities in various scientific fields.

Home offices of the Pittsburgh Corning Corp. have been transferred from the Pittsburgh Plate Glass Building to 307 Fourth Ave., Pittsburgh. The larger quarters will enable the firm to better





PHTHALIC ANHYDRIDE

Form		Clean, white flakes
Color	Molten	55 Max. (Hazen)
	Solid	Pure White
Solidifying Point		130.5° C Min.
Odor		Slight, characteristic
Insoluble in Water		0.01% Max.
Maleic Anhydride		0.40% Max.
Foam Time		18 minutes Min.

Containers: 5-ply Paper Bags—80 lb. net weight.

Barrett* Phthalic Anhydride is of uniform and unsurpassed quality—pure white, free-flowing flakes containing a minimum of fines.

Carefully controlled for freedom from materials which cause premature gelling and excessive foaming, Barrett* Phthalic Anhydride is widely used in the production of alkyd resins for metal finishes, enamels, paints and varnishes.

Phthalic Anhydride is a basic material in the production of phthalic esters for vinyl resins used in the manufacture of upholstery, handbags, luggage, floor tile, raincoats, shower curtains, etc.

The dyestuff industry finds Phthalic Anhydride essential as a basic material in the manufacture of anthraquinone, dyes, phenolphthalein and other synthetic organic chemicals.

Send for copy of Barrett's 48-page illustrated booklet, "Phthalic Anhydride."

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

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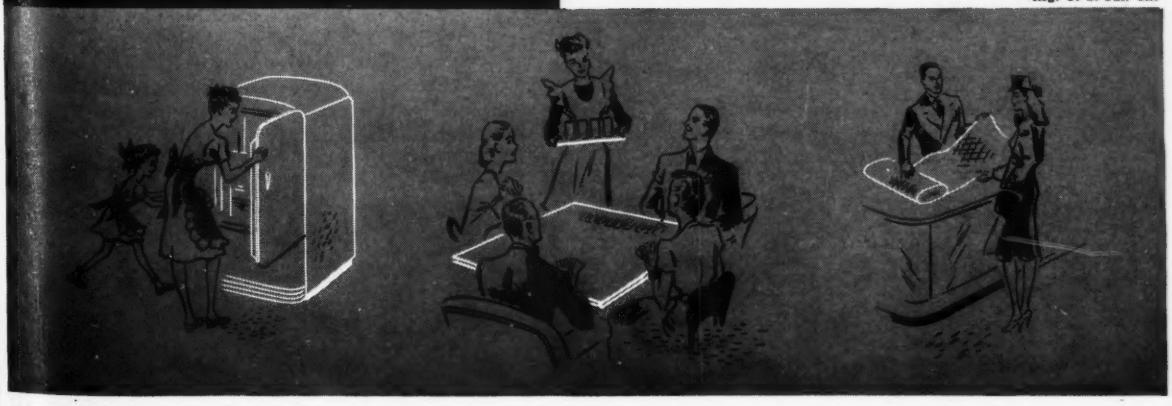


serve buyers of its two products, structural glass blocks and cellular glass insulation.

Publicker Industries, Inc., has expanded its distribution organization by the addition of 11 exclusive selling agents in 13 cities, largely in the Middle West. The new distributors will handle industrial alcohols, solvents and other chemicals, including Paco solvent, butyl alcohol, butyl acetate, ethyl acetate and acetone.

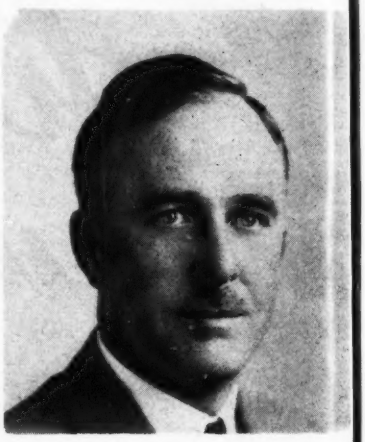
Tilford H. Bean, appointed manager of manufacturing for Stanton Chemicals, Inc. He will be in charge of the company's new plant now nearing completion at Corpus Christi, Texas.

President Truman has appointed the 10-man Water Pollution Advisory Board which is the administrative agency established in the Public Health Service by the Water Pollution Control Act. It consists of Mark Hollis, office of the Surgeon General, chairman; Lt. Hugh M. Arnold, Dept. of the Army; Milton C. James, Dept. of the Interior; James W. Follin, Federal Works Agency; Ralph R. Will, Dept. of Agriculture; and of the non-federal government representatives, Thomas Berrigan, chief engineer of sewers for Boston; Michael Klein, chief engineer of the Borough of Manhattan; L. A. Danse, chairman of the committee on water pollution abatement of General Motors; Stanley Freeborn, assistant dean of the College of Agriculture, University of California; Carl D. Shoemaker, conservation director of the National Wild Life Federation; and Nathan T. Veatch, consulting engineer and past president of the American Waterworks Association.

Pemco Corp., Baltimore, Md., has established an employees' retirement plan for the purpose of paying pensions or other benefits.

The Industrial Products Sales division of The B. F. Goodrich Co. has become the industrial and General Prod-

ucts division and now includes Plastic Products sales and production departments.



W. Albert Noyes, Jr., editor-elect of the "Journal of the American Chemical Society." He will succeed Arthur B. Lamb who will retire at the end of 1949.

British chemical developments resulting from applied technology and research will be reflected in the chemical section of the British Industries Fair, to be held at Earls Court and Olympia, London, and Castle Bromwich, Birmingham, from May 2 to May 13. The chemical exhibits will be housed at Olympia.

Canada will be the dominant exhibitor in the Chemicals and Radium section of the 1949 Canadian International Trade Fair to be held at the Toronto Exhibition Grounds, May 30 to June 10, under sponsorship of the Dominion Government.

Fisher Chemical Co., Inc., New York City, has been appointed exclusive sales agents for F. O. Cockerille Co., Greenwood, Va., manufacturers of alpha naphthalene acetic acid and its derivatives.

Approximately $6 million in cash and securities has been given to the Carnegie Institute of Technology by The W. L. and May T. Mellon Foundation to establish the nation's first graduate school of industrial administration.

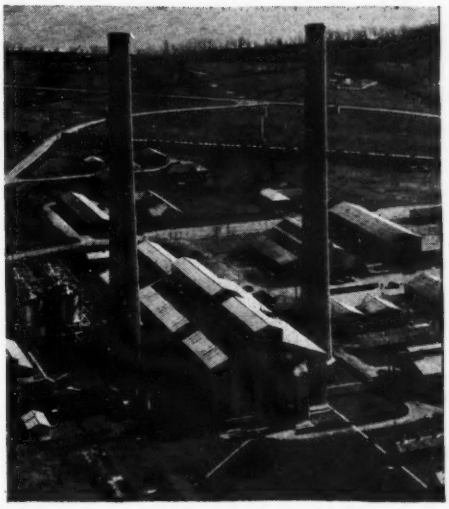
Information concerning current Army procurement programs, submission of bids, buying and purchasing offices, and abstracts of bids, can now be obtained at the Procurement Information Center, room 4E789 of the Pentagon.

Applications for study during the summer of 1949 under the six-week General Electric Science Fellowship Program are now being accepted by Union College, Schenectady, N. Y., and Case Institute of Technology, Cleveland, Ohio.

SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*MINING



The process of mining sulphur, as developed by Herman Frasch, takes advantage of the fairly low melting point of sulphur (about 240° Fahrenheit). The process resolves itself into three parts: one, operating a power plant that heats and pumps to the field large quantities of water; two, distributing the hot water through wells to melt the underground sulphur, and raising the melted sulphur to the surface; three, cooling and solidifying the sulphur in large vats from which it is broken and loaded into cars for shipment.

The power plant and water reservoir, as well as the vats and permanent structures, are placed at some distance from the sulphur deposit to avoid possibility of damage from surface subsidence, resulting from extraction of the underground sulphur.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.

TEXAS GULF SULPHUR CO. INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

The program is open to 100 science teachers selected on a competitive basis from 19 northeastern states, and the District of Columbia. The fellowships, which cover complete expenses, are designed to bring the latest developments in chemistry and physics to experienced teachers of proper qualification.

Ohio Solvents & Chemicals Co. is the new name of the Ohio Mineral Spirits Co., Cleveland.

The Stauffer Chemical Co. is offering western consumers a sewage treatment grade of ferric sulfate. Produced at its Richmond, Cal. plant, this material, said to be the first ever made in the west, will be of interest to industries and cities faced with tighter regulations governing pollution of waters by sewage and industrial effluent.

PERSONNEL

Company Officers

• Lee H. Bristol, executive vice-president of Bristol-Myers Co., New York, has been elected president of the company. He succeeds his brother, Henry P. Bristol, who became chairman of the board.

• American-Marietta Co. has appointed David E. Eichelberger as president and Douglas E. Bryant as manager of its subsidiary, Leon Finch, Ltd., Los Angeles.

• John Hay Whitney has been elected chairman of the board of directors of Freeport Sulphur Co. He held the post from 1934 until 1942, when his resignation to enter the U. S. Army Air Force was accepted.

• S. B. Penick & Co. has appointed Charles A. Myers as vice-president, to act as managing director of its Essential Oils Division.

• General Mills, Inc., has appointed Eugene Woolley as division vice-president. He is manager of the company's Belmond, Iowa, soybean processing plant.

• J. R. Carringer, vice-president, has been named assistant to the president, Esso Standard Oil Co. H. G. Burks, Jr., has been elected a vice-president and will succeed Mr. Carringer as contact director for the manufacturing, supply and transportation and chemical products departments, and M. W. Boyer will assume Dr. Burks' former position as director of all manufacturing operations for the company.

• H. M. Hooker has resigned from the position of chairman of the board of Hooker Electrochemical Co. The position will be left vacant for the present. J. H. Babcock has been appointed director of development and research.

• A. V. Astin, formerly assistant chief of the Electronics Division of the National Bureau of Standards, has succeeded the late Harry Diamond as chief of this division.

M. E. Gilwood, formerly assistant manager of research, has been named manager of chemical research for The Permutit Co.

• Joseph W. Mares, general manager of the Texas Division, Monsanto Chemical Co., has been elected a vice-president of the company.

Production

• Henry O. Farr has been named production and technical director of the Murphy Paint Co., Limited, a Canadian affiliate of Pittsburgh Plate Glass Co. He will have full responsibility for the manufacturing and technical operations of the company's four manufacturing plants in Montreal, Toronto, Windsor and Vancouver.

• Frank H. Stohr has been named general manager of the Allis-Chalmers Manufacturing Co.'s Norwood Works. He was executive vice-president and a director of the Elliott Co. of Jeannette, Penn.

• Chas. Pfizer & Co., Inc., has promoted Herman A. Poitras, former superintendent of the Terre Haute, Ind., plant, to general production manager, and D. C. McClain has been appointed director of engineering of all of the company's plants.

• Laurence D. Gibson has joined Wollen Chemical and Supply Co., Paterson, N. J., as technical director and production manager.

• Kenneth W. Short has been named purchasing agent for Monsanto Chemical Co.'s Plastics Division at Springfield, Mass. He has been acting purchasing agent for the Division since October 1, when Glenn M. Bullard retired.

Sales

• George H. Brannan has been appointed to manage pigment sales in the Philadelphia office of Binney & Smith Co. He will handle the sale of carbon blacks, iron oxide colors, bone blacks and other products.

• The Pennsylvania Salt Manufacturing Co. has opened a new district sales office in Appleton, Wis., for its Heavy Chemicals Division. C. H. Anderson, of Pennsalt's Chicago office, has been placed in charge as district sales manager.

• John N. Fencil, of New York, has been named eastern district sales manager for the Tar Products Division of Koppers Co., Inc. Since 1946, Mr. Fencil has been eastern district building materials sales manager for the division, with headquarters in New York.

Research

• The Du Pont Co. has appointed G. Preston Hoff manager of the technical division of the Rayon Department, and named Winfield W. Heckert, director of acetate rayon research, assistant manager of the division.

• William A. Bittenbender has been appointed director of the technical development department of Merck & Co., Inc. Dr. Bittenbender had previously held the position of assistant director of the department.

George H. Kent, appointed director of sales for E. F. Drew & Co., Inc. He was previously director of sales planning and general economics for the Koppers Co., Inc.

• Carl Deuber has been appointed assistant director of Centro Research Laboratories, Inc., New York.

• The Quaker Chemical Products Corp., of Conshohocken, Penna., has appointed W. J. Haring as technical director.

Associations

• Edgar Reynolds Smith, chief of the Physical Chemistry Section of the National Bureau of Standards, has been awarded the 1949 Hillebrand Prize of the Washington Section of the American Chemical Society.

Dr. Smith, who prepared the first samples of heavy water, now used by other countries in their atomic piles, was cited for his "original work in physical chemistry, more especially contributions to electrochemistry and ebulliometry."

• Eugene G. Rochow, of Harvard University, a pioneer in the development of the silicone industry, has been chosen to receive the third Leo Hendrik Baekeland Award of the American Chemical Society's North Jersey Section. He was cited for his research on the versatile compounds of silicon.

CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

Dye for 1080

Monsanto Chemical Co. now has available a dye concentrate to be used with its compound 1080, the powerful non-specific rodenticide. The dye, Nigrosine black, has been approved by the U. S. Fish and Wildlife Service. The move is a further precaution in the use of this extremely poisonous chemical.

Heretofore commonly used in the form of a colorless, innocent-appearing water solution, the colored 1080 rodenticide will be unattractive to human beings. The policy of severely restricting the sale of this chemical, however, will be continued.

Although Monsanto plans ultimately to sell only suitably colored compound 1080, it is making the concentrate available immediately for coloring rodent baits made from present stocks of 1080, thus reducing the hazards to the public as quickly as possible. During the interim, the dye concentrate will be sold in ½ gallon bottles. It should be used at the rate of one fluid ounce per gallon of compound 1080 rat bait, prepared according to instructions issued by the National Research Council. The NRC is the war-time government agency which developed this rodenticide.

Hercules Relinquishes Toxaphene Trade-Mark

The Hercules Powder Co., has surrendered its trade-mark name for chlorinated camphene, Toxaphene, in response to the need for a simple name for that insecticide. The Bureau of Entomology and Plant Quarantine has accepted it as a coined name for chlorinated camphene having a chlorine content of 67%-69%, and henceforth the insecticidal chemical meeting that standard will be referred to as "toxaphene" with a lower case "t".

Fire-Retardant Paint Introduced

A highly efficient new fire-retardant paint that is also non-toxic has been introduced for both consumer and industrial use by the Stallton Chemical Corp., Long Island City, N.Y. Called Flame-Seal, the new paint comes ready to use, and can be applied directly from its original container by brush or spraygun.

Stressing the fact that firemen often consider smoke and fumes released by burning paint more deadly than fire itself, the manufacturers report that tests show Flame-Seal generates no smoke or toxic gases when attacked by fire. When unpainted lumber is protected with it, the wood is said to withstand a 2000°F blow-torch for 30 minutes without any flame spread.

The new paint is also said to be moisture-proof and termite proof, and not to craze, chip, peel or crack. Moreover, it can be washed with any standard soap or washing powder without lessening its fire-retardant effectiveness. Flame-Seal is available in an oyster-white flat finish and can be obtained in single quarts, 2, 5 and 55-gallon containers.

A. Paul Thompson, named director of research, Eagle-Picher Co. He previously held a senior fellowship at the Mellon Institute of Industrial Research.

Luckman New President Of Soap Association

Charles Luckman, president of Lever Brothers Co., Cambridge, Mass., was elected president of the Association of American Soap & Glycerine Producers, Inc., at its twenty-second annual convention meeting held in New York recently. He succeeds G. A. Wrisley, vice-president of the Allen B. Wrisley Co., of Chicago.

At the same meeting, N. H. McElroy, president of Procter & Gamble Co., Cincinnati, was elected vice-president for the Mid-West.

Re-elected to their posts were the following officers: E. M. Finehout, vice-president, of the Los Angeles Soap Co., as vice-president for the Far West; Edward H. Little, president of the Colgate-Palmolive-Peet Co., Jersey City, as vice-president for the East; Nils S. Dahl, general manager, John T. Stanley Co., New York, as treasurer of the association.

Offers Plastic Coating

Wilross Products Co., Hawthorne, N. J., has developed a new plastic coating that is finding use in preparation of decorative papers. It has high gloss; good flexibility to suit most papers; adhesion that is good to most plain and printed stock and excellent to glassine, cellulose acetate, cellophane and most metallic foils; good heat sealability at 250-270°F.; and good mar-proofness. It dries well, is non-blocking and appears to be non-toxic. It is supplied in colors to suit the user's requirements.

AIFA to Change Name, Broaden Membership

The Agricultural Insecticide & Fungicide Association will shortly change its name to the National Agricultural Chemicals Association, and will transfer its headquarters from New York to Washington, D. C. To enhance the value of their membership to those already in the association and to permit greater interchange of information among those with common problems, the following groups will be eligible for membership under the new set-up: basic producers, reprocessors and re-mixers, custom applicators, equipment manufacturers, suppliers, regional associations, individuals, and allied industries.

Powell Co. Expands

As part of a comprehensive expansion plan of John Powell & Co., Inc., a new technical service department has been organized to provide assistance to customers in solving biological and technical problems. Kenneth Nash has been appointed director of the new department in the company.

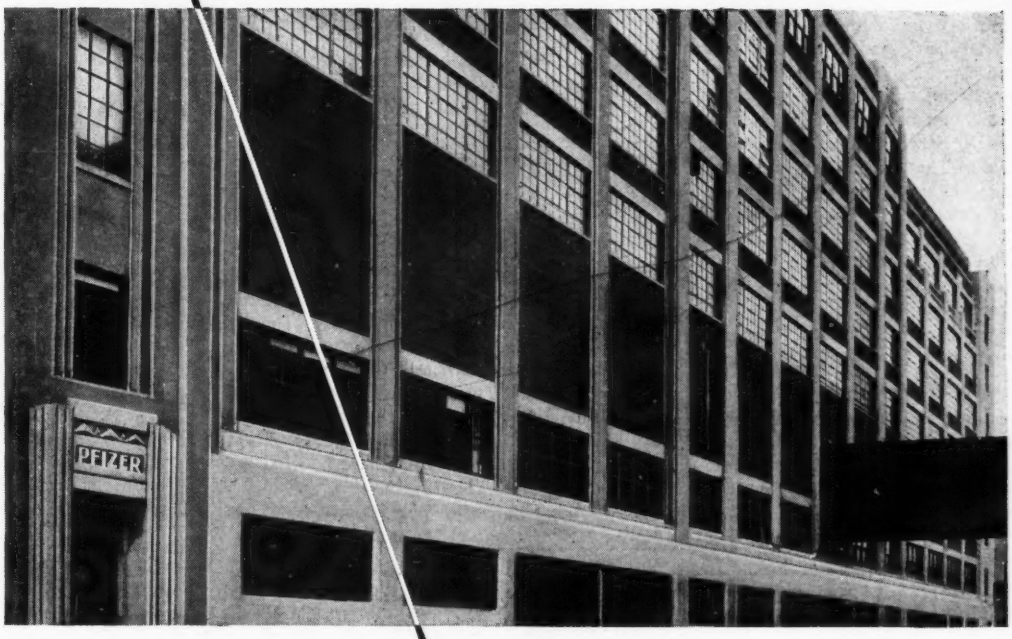
Other steps include transfer of Powell's laboratory to its Brooklyn plant, and the closing of the San Leandro, Cal., plant to make way for the opening of entirely new facilities. In the interim all West Coast matters will be handled by the main office in New York. The St. Louis sales office is being transferred to Fort Worth, Tex.

Floor Enamel Based on Vinylite Resins

A new long-wearing floor enamel for use on wood, concrete and metal floors that receive heavy wear is being manufactured by the Benjamin Foster Co., Philadelphia, Pa. Based on Vinylite resins, the coating is claimed to be unaffected by water, greases, oils, brine, alcohols, petroleum solvents, soaps, all alkalis and most acids. After cleaning with soap and water, the surface has the appearance of being freshly waxed, and yet is slip-resistant.

The coating is applied by brush or

WAREHOUSE



...without Windows

● An entire floor without windows is a feature of Pfizer's newest 8-story building at Brooklyn, N. Y. From the outside this block-long area gives little indication of its use as a modern warehouse.

On entering, you would see many safeguards taken to insure "Pfizer Quality" in chemicals. As you first pass through air-lock doors, operated automatically by photo-electric "eyes", it is obvious that you are in no ordinary warehouse.

Should the outside temperature be soaring, as it often is in Brooklyn summers, you would immediately welcome the coolness — an even 75° on the average. Should you come in from the icy streets in winter, you would appreciate the moderate 70°. Twelve months a year, the relative humidity of this air conditioned area is controlled at an average of 45 to 50%.

Not every Pfizer chemical requires air conditioning and humidity control. But you can be sure that those which do are assured of this continuous care. Throughout 532,450 cu. ft. of air conditioned warehouse space, Pfizer chemicals are provided with consistent uniformity in storage to match uniformity in manufacture. Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N. Y.; 211 E. North Water Street, Chicago 11, Illinois; 605 Third Street, San Francisco 7, Calif.

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spray. Two coats are recommended for maximum wear, with four to eight hours allowed between coats. It comes in a variety of colors, and retails at about $2 for one quart, and about $7 for a gallon.

Ansul Markets Wax-free Oil

An all-purpose refrigeration oil has been introduced by Ansul Chemical Co. The oil is said to be equally suitable for household refrigerators, deep freezers, meat counters, domestic and commercial cold storage lockers, and all other refrigeration and air conditioning applications.

The oil does not separate wax down to minus 70°Fahrenheit in oil-refrigerant mixtures. The company's laboratory tests show it has a low pour point and will not decompose to form sludges or acids.

The oil will be packaged in one gallon cans and will be on sale at leading refrigeration wholesalers.

Nielco Labs Offers New Developments

A rust preventive and primer and a corrosion control for pickling of ferrous metal are among the latest developments of Nielco Laboratories, Detroit, Mich. The coating, called "Niel-Coat P-110", is applied to rusted surfaces, and by bonding to the metal, destroys corrosive action and prevents rusting after application. Its effectiveness is attributed to a fixed percentage of phosphoric acid incorporated within the vehicle. Sufficient pigment has been added to the formulation to leave a tooth upon drying for subsequent painting.

The "Nielite" D pickling acid is a compounded acid produced from a phosphoric acid base. It has incorporated the correct balance of other acids and inhibitors to prevent it from attacking the base metal. It contains neither sulfuric nor hydrochloric acid and is put up in a concentrated liquid ready for mixing with water. After use of this pickling acid, parts have been stored as long as 6 months without rusting.

Calcium Oxide Improves Soybean Oil Paints

Improved outside white paints have been made from 100 percent soybean oil vehicles by utilizing from 5 to 10 percent of calcium oxide as one of the pigment components. These paints, made at the Northern Regional Research Laboratory, Peoria, Ill., have been found to give coatings that dry faster, harder, and free from tack, both residual or after tack; that do not yellow in dark areas; that have greater reduced dirt retention and remain clean and white in service; and that have increased resistance to checking, cracking, and alligatoring, the defects which make satisfactory repainting very difficult. Calcium and other alkaline earth oxides appear to react with oxidation products in the film to negate their plasticizing effect.

Quaker Introduces New Stripper

Quaker Chemical Products Corp., Conshohocken, Pa., has developed a stripper called Quaker Strip 15 which is said to remove the new types of urea melamine, vinyl, and bis-phenol finishes of both the air dry and baked type in less than five minutes time. No expensive or hazardous solvent or special equipment is needed in the operation.

The product is applicable to both the new and old type finishes so that the necessity of maintaining a special stripping bath for either class of work is obviated.

Mold Release Compound

Moldrite Products Co., Pawtucket, R. I., has developed a mold release compound called "Mold-Eze" which reduces time lost by sticking of plastic articles to molds.

It is claimed to improve plastic flow, but does not cause flash; it does not build up on mold surfaces nor affect gloss. Neither does it contaminate the product nor break down at molding temperatures. The compound is effective both in compression and injection molding.

Markets Air Germicide

An electrical diffusor of triethylene glycol vapor is being manufactured by Parkway Products Corp., Chicago, and will be sold on a nation-wide basis under the trade name, Tegolizer. The product, designed to kill air-borne bacteria through the germicidal action of the glycol vapor, will find application in homes and offices. The amount of liquid necessary to treat the air properly is said to be minute, making the product very inexpensive to use.

New Window Cleaner

Safeway Specialty Corp., New York City, is manufacturing a window cleaner that is used dry. Chemically impregnated felt is rubbed on window or glass surface until it glides smoothly. This rubbing action removes film, dirt and grime; leaves the surface sparkling clean and makes future cleaning easier.

This new device (U. S. Patent No. 2,446,401) is made of featherweight magnesium. It has a rotatable head with chemically impregnated felt on one side, rubber squeegee on the other. Handle has rubber grip and is twelve inches long. The rubber squeegee is used to remove dew, mist, rain and snow.

In the house it is used for mirrors, windows, glass doors and tile surfaces.

Glucose-Glycol Paste

As a part of a program to control warping of book covers, the U. S. Government Printing Office in cooperation with the Printing Industry of America, Inc., developed a glucose-glycol paste to replace flour-water paste for the casing-in process. This adhesive contains 50 percent water, which is thinned to a water content not exceeding 65 percent before use on the casemaking machines, as contrasted to 85 percent water in flour paste. Following is the formula of this adhesive as reported in GPO-PIA Joint Research Bulletin, Bindery Series No. 8, "Control of Warp in Book Covers", which is for sale by the Superintendent of Documents, Washington, 25, D. C.:

	Per Cent
Water (added at the start)	35.0
Diethylene glycol	10.0
Ammonium alum	.3
Beta naphthol	.1
Glucose (43° Baumé corn sirup)	20.0
Flour (from soft winter wheat)	19.6
Water (from steam condensation)	15.0
Total	100.0

Deep Colors Added To Kem-Tone Line

Eight new deep colors have been added to the Kem-Tone line of resin and oil wall paint manufactured by the Sherwin-Williams Co. The new colors, called Kem-Tone Vogue Deep Colors, are designed to be used full strength or for the tinting of any of the present twelve Kem-Tone colors and white.

Although matching of pastel hues has been possible with the shades previously offered, deeper colors had not been available in this type paint. With the new colors, it is said that non-professionals can match any of the shades required for decorating walls and ceilings.

Our Talc Now Comparable To Foreign

An adaptation of a process developed during World War II to supply thousands of tons of talc for insulating radar equipment has resulted in a grade of talc comparable to the French and Italian talcs previously imported for cosmetic use. Talc, a soft and easily pulverized stone occurring in abundant deposits in this country, is now ground and processed by special methods that provide the cosmetic industry with a product practically free from grit and devoid of particles so fine that they might clog too many pores of the skin. Oliver L. Marton, chief

chemist of Shulton, Inc., Clifton, N. J., pointed out these developments in a recent talk before the Passaic Valley Group of the American Chemical Society's North Jersey Section.

Dr. Marton further explained that the finished powder is made to conform with a set of specifications established to reduce the natural alkalinity of talc, among other features. This brings it down to the neutral point much closer to the slight acidity of the human skin.

Bee Chemical Offers Mold Lubricant

A new mold release material, designed to eliminate difficulties frequently encountered in the plastics industry, has been developed by Bee Chemical Co., Chicago, Ill. Called "Logolube", the new material is a liquid, and hence easier to apply and control than dusts which are often used for the purpose. The makers claim that less is required to do the job in comparison with other liquid lubricants.

One of the advantages of the new lubricant is that it does not interfere with painting of molded parts. If desired, it can be removed from the plastic by wiping with a cloth wet with alcohol. It may be thinned for spraying on the mold or may be applied with a brush. It is now available for prompt deliveries in reasonable quantities.

Pillsbury Appoints Distributor

Pillsbury Chemicals, Detroit, manufacturers of drawing compounds, announce the appointment of J. Frank Daly and Associates, Hartford, Conn., to handle the distribution of their products in the New England area.

New Diesel Lubricant

A new Diesel engine lubricant, designed to counteract the harmful effect of high sulfur fuels, has been developed by the D-A Lubricant Co., Inc., Indianapolis, Indiana.

The new product, D-A "Extra-Treated" Diesel oil, is an additive-type lubricant designed for use in high-speed Diesel engines. Its development is based on results obtained from full scale laboratory engine tests and field performance records.

Owners of certain type Diesel engines operating on Diesel fuels with a sulfur content in excess of 0.5 per cent have been confronted with the problem of engine sludge resulting in stuck rings plus a high rate of liner wear. D-A "Extra-Treated" Diesel oil will eliminate these sludging and wear conditions.

D-A engineers point out that new oil is recommended only for use with high sulfur content Diesel fuels. Regular D-A Diesel oil is recommended for use under all ordinary conditions.

CHEMICAL MARKETS

Alcohol Hits New Low In Price Battle

Repeated price breaks that have brought industrial alcohol from 75¢ a gallon last November to the present 21¢ level spotlight the fight between synthetic and fermentation alcohol, and put the material in a better competitive position for many uses.

The immediate effect has been a general softening of the solvents market, and both isopropyl alcohol and acetone have dropped. In addition, ethanol, which last season lost much ground to methanol in the anti-freeze market because of the price difference between them, is now selling below it, and is in a very favorable position to gain a better share of contracts being placed by large anti-freeze producers for next year's requirements. Ethylene glycol, the base for permanent-type anti-freeze, should not be appreciably affected by the ethanol price drop. Any reduction in the approximate $1.25-a-gallon retail price for an anti-freeze based on methanol or ethanol will probably not be sufficient to alter the preference of a consumer who has decided on the $3.50-a-gallon permanent type. A severe recession might change this situation, but otherwise it looks like a fight between ethanol and methanol for the "non-permanent" portion of this market.

The purchase by Publicker Industries, Inc., of 80 million gallons of Cuban molasses left over from 1948 production at a price reportedly tied to the price of ethanol dates the current ethanol battle. The price cuts that have followed have resulted in giving fermentation producers a cheap raw material that puts them on more equal footing with the synthetic producers whose raw materials from petroleum sources are relatively cheap. Molasses, which was as high as 32¢ a gallon last year, is estimated to cost a little less than 4¢ a gallon under the reported pricing arrangement. To maintain this favorable competitive position with synthetic producers, fermentation producers hope to get molasses from the crop soon to be available at even lower prices—as low as 2¢ f.o.b. Cuba.

Of last year's estimated production of 160 million gallons of alcohol, synthetic producers accounted for seventy per cent (*CI, February 1949, pp. 212-214*). Their production costs are about 18¢ a gallon, which is roughly equal to the production cost of fermentation alcohol based on molasses at 4¢. Because operations of companies producing the synthetic material are very diverse, they are in a better position to weather the current period in which much of the profit has been squeezed out of alcohol. Since their production is needed to supply the market, they will eventually set the price, and it should level at a point that will give them a reasonable profit.

Inorganic Production Dips Slightly

Production levels of industrially important inorganic chemicals for November were generally lower than those for the previous month, and generally higher than for November, 1947.

Increases from October were registered by 10 of the 35 chemicals included in the Bureau of Census' continuous monthly survey while decreases were reported for 23. Twenty-three of the 35 chemicals, however, were produced in larger quantities during November 1948 than during November 1947, while 10 were produced in smaller volume. (Data for 2 chemicals were not included because of possible disclosure of individual company operations.)

The 46,147 short tons of synthetic ammonium sulfate and the 212,494 short tons of caustic soda in November were the largest reported for these commodities in any month for which this survey has been conducted. Sulfuric acid production in November exceeded the previous month's production of 950,801 short tons by 2,424 short tons.

Production declines from October for other "heavy volume" chemicals were small and did not exceed four per cent for any of these products. In some cases the November production levels were exceeded only by the record highs attained in October 1948. For example, the 147,451 short tons of chlorine produced in November were only 142 short tons below the record production in October.

Ample Insecticide Supply In the Offing

The supply of chemicals for insecticides should be ample to meet requirements in 1949, according to the U. S. Department of Commerce. This is particularly true of the synthetic organics such as benzene hexachloride, chlordane, chlorinated camphene, and parathion for which additional facilities have been built or are being built.

Pyrethrum acreage has declined in the past year because of unfavorable prices in the world market. This decrease in pyrethrum supply, combined with resumption for uses which had been more or less supplanted in the last few years by synthetic organic bases, could result

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GATX GENERAL AMERICAN TRADE MARK

in a tight supply situation during the coming season.

Because of lessened demand, a drop in prices, and additional cost of labor, collection of rotenone-bearing roots in South America declined somewhat in 1948. However, imports during 1949 are expected to meet demand, providing supplies are received in time for grinding and distribution.

Raw materials for the manufacture of lead and calcium arsenate are sufficient for production requirements, with prices continuing at high levels. Copper sulfate output is expected to be adequate.

High Output, Price Dip In Prospect for Lead

This year's supply of lead will continue at a high level, and a falling off in demand by one of the leading consuming industries may portend a lower price for this metal. In addition to increased mine output, large imports are expected to continue, and there is a large supply of lead scrap which would indicate heavy secondary production.

Last year an estimated 1,155,000 tons of lead were available to domestic consumers. This consisted of 380,000 tons of U. S. production, 470,000 tons recovered from scrap, and 305,000 tons of imports. Consumption in 1947 was slightly higher at 1,200,000 tons of which 375,000 tons came from U. S. mines, 480,000 tons were recovered from lead scrap, 215,000 tons were imported, and about 100,000 tons were withdrawn from stocks.

With a slump in the storage battery industry, which normally consumes about one-third of lead supplies, there may be some reduction ahead in the price of the metal. Manufacturers faced with supplies of batteries in excess of demand have cut production and trimmed orders for new lead. An easy supply of lead will be a welcome change from conditions that have prevailed up to now.

Lead has climbed steadily in price until now at 21½c a pound, it is more than 300 per cent above the prewar price. This rise has hit chemical industries using it as a raw material. While its use in tetraethyl lead for anti-knock gasoline has increased, the paint industry has shied away from lead pigments as much as possible, and many producers have eliminated them from formulations. The combination of high price and shortages also has cut down on the quantity of lead going into insecticides. If a price reduction follows the change in supply, these trends may be slowed down or reversed.

Market Review

Wondering when the price for industrial alcohol would reach the bottom continued to be a major activity. Although the quoted price for tax-free pure ethyl alcohol went to 21¢ a gallon, sales as low as 17¢ were reported. (See accompanying report on price battle.)

Acetone was dragged down a full cent to 7½¢ a pound in tankcars by the alcohol drop, and a series of breaks reduced isopropyl alcohol 7½¢ a gallon to 22½¢ for the 91% material in tankcars.

The general group of heavy chemicals remained firm with both chlorine and anhydrous ammonia very tight. Both of these materials moved in great volume as did crude sulfur. Although oxalic acid appeared easier, it was no indication that the general domestic supply position was any better. Producers were still making deliveries only to contract customers, and the easing was attributed to lack of export demand. Iron-free aluminum sulfate was up 25¢ per cwt. as it moved at $2.75 a cwt. Dollar shortages continued to hit export demand for alkalies, and there was some falling off in domestic call for these items too, but this was viewed as only temporary.

Demand continued strong for the basic coal-tar chemicals, and users were happy to find phenol, naphthalene and phthalic anhydride in better supply. Benzol, however, was still not in great abundance as the only consumers able to satisfy their requirements were old established customers.

Among fine chemicals, the first change in over a year in USP powdered camphor brought the price down to 58¢ a pound as the synthetic refined material was reduced 5-8¢. Antibiotics continued to be in brisk demand, and streptomycin and penicillin sold at record low prices. Some synthetic glycerin moved out into consumers at a reported price of about 22¢ a pound in tankcars f.o.b. plant. Although it was felt that the amount was not enough to affect the price of the natural material, there may be a sharp downward revision ahead in the price of natural glycerin as it comes into adjustment with this price. Because of the uncertain long-term price prospects caused by this development, there was very little forward interest in crude glycerin.

There arose the possibility of price revisions for a number of plasticizers as the price for diethyl phthalate was reduced 6¢ a pound, bringing the tankcar price to 26¢.

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

Does your advertising manager rate an invitation to the management table?

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Management's first responsibility is to show a fair profit. This requires a relentless search for continued improvement – in design, in purchasing, in production, research and cost-accounting. Each deserves its place at the management table. Yet none of these activities can actually create a dollar of profit, for the simple reason that you can't *produce* anything at a profit – not unless you can also *sell* it.

And that's what makes the advertising manager's job so important.

His first responsibility is to see that your company's products are made familiar (and desirable) to the greatest number of prospects, at the lowest possible cost. In fulfilling this responsibility, he sets a parallel course with the sales department, although his approach more closely resembles that of the assembly line technician.

For advertising, as he sees it, is simply the application of assembly line techniques to the *manufacture of a sale*. Just consider the five basic steps involved:

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

By *mechanizing* the first three of those steps, advertising increases management's chance to show a profit. It leaves your salesmen free to concentrate on the two jobs which they alone can do, and do best.

And nowhere does this mechanizing process operate more efficiently than in the business press, where it reaches your best prospects at the lowest possible cost.

Perhaps that's why so many smart advertising managers are partial to business paper advertising – and why more of them, incidentally, are getting to sit at the management table!

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BUYERS' MARKET

(Continued from page 388)

PLASTICS

The best indication of the 1949 outlook for plastics is found in the present supply and price situation and the current volume of production.

Supplies of plastics materials have shown definite improvement over the past year. To a great extent this has resulted from increased production as new facilities came into operation. The supply-and-demand position for plastics has been brought into better balance than at any time since the war and the industry has changed from a seller's to a buyer's market.

Increasing supplies of plastics at prices that have risen less than those of other materials indicate a better competitive position for plastics as a group. These factors foreshadow sharper competition not only between plastics and other materials but also among the different plastics materials themselves. Cellulose acetate is replacing cellulose nitrate in many applications.

Until recently there has been a downward trend in prices of plastics. However, increasing costs of producing all commodities has more than offset economies in the cost of producing plastics and the downward trend has been checked, even reversed to some extent. However, such advances have been relatively small. As a result of operating economies effected through large scale production, utilization of cheaper sources of raw materials, and more efficient processes, the plastics industry has established a record in reducing prices for over a period of years. The future trend probably will be determined largely by general economic forces rather than by factors within the industry itself.

There are almost unlimited sources of raw materials for the manufacture of plastics and there is a vast amount of research under way to find still lower-cost materials, more economical methods of production and broader utilization.

With production of plastics materials now amounting to over a billion pounds annually for all major classes, material producers have accomplished an unprecedented expansion in production capacity.

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SCREENING NEW CHEMICALS

(Continued from page 398)

it profitable to make a particular item and may be forced to drop it from its line. Possibly a strike in the supplier's plant may curtail shipments of a basic raw material.

Patent Situation: Usually, research chemists and the legal department can and do handle most of the legal phases dealing with the filing of a patent application on a new product such as "Plastolex". However, the market researcher may either request that an infringement search be made or may check and verify several points himself. He should, therefore, be familiar with several sources of patent information: The "Annual and Decennial Chemical Abstracts Index" references patent literature both by subject and formula. The last section contains a numerical index of the patents abstracted in "Chemical Abstracts" and may be consulted if the patent number in question is known. If it is desired to locate patents issued to a particular patentee or company, the "Official Gazette" published by the U. S. Patent Office may be consulted, since it lists all patents issued weekly.

A knowledge of these patent research tools is highly valuable to the marketing specialist, but they do not replace legal training. In general, patent surveys are best conducted by experienced patent attorneys.

Cost and Margins: Engineering research will estimate all material and processing costs for "Plastolex" based on several tentative manufacturing processes. When the market researcher is able to point up sufficient sales volume potentials for the new product, his findings may indicate a pilot plant operation. This would determine among other things if a continuous esterification process will be more economical and assure greater uniformity of product than could be obtained from a batch process. The process ultimately chosen, of course, will dictate the necessary equipment and required capital investment either to build a suitable new plant or expand the facilities of an existing one.

In the final analysis, the sales organization in cooperation with commercial research will set forth costs required to promote, advertise, and properly sell the new product. And lastly, management will decide what future steps should be taken.

If estimated margins on "Plastolex," for example, are in keeping with calculated investments and risks involved, the product undoubtedly will get the green light. There is no set rule as to maximum net profits before taxes required by management on a new chemical venture. Profit requirements will depend largely upon the type of chemical to be produced; then, too, the financial condition of a company will always affect management's decision as to the returns a new product must offer to warrant new investments.

RESULTS OF SCREENING

In the example of "Plastolex," then, the market researcher has briefly developed the pertinent points in the new product's commercial appraisal. He has clearly developed the product's properties and sales virtues. He has examined its applications, market potentials, anticipated future sales trends, selling price, costs and margins, and he has studied competitive companies and products. He may have discovered that one or two suppliers hold a major share of the plasticizer market. If so, he should learn what factors have given those suppliers the edge over the rest of the field and determine whether the inherent characteristics of his company or his product may enable him to modify this situation.

He has learned that although one or two types of competitive products are finding wide use, they are not entirely satisfying the requirements of the vinyl resin industry. He has further concluded that shortage of suitable plasticizers has restricted greater production of certain types of vinyl resins. Presumably, he has also investigated the raw material situation and anticipates no difficulty in securing supplies. He has also found that the cost, profit, and margin picture, both from the buyers' and sellers' standpoint, is satisfactory and promises to benefit both.

The conclusions drawn from any screening, like the hypothetical study of "Plastolex," should clearly indicate the course that a company should follow. The preliminary report should be based on facts rather than individual opinion. Where opinions are necessary, they should be carefully cross-checked for validity.

The screening of "Plastolex" as developed, was treated in a way to point up promising market possibilities and, as a result, we shall assume that management, market research, and other interested groups will concur that the development program should proceed with all possible speed.

Since this article is limited to a discussion of market research in screening new chemical products, we will not develop the subsequent steps followed in expanding the analysis to an extensive market survey. As mentioned before, screening is the starting point, not the end point, in the appraisal of the commercial aspects of a new product.

Before spending large sums of money for a detailed analysis, however, the market research organization, through screening, will have developed a reasonably accurate idea of the new chemical's commercial potential. This knowledge means a saving of time as well as money—both doubly important to a small market research group attempting to cope with an avalanche of new products.

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FROM WHERE WE SIT

by "DOC"

ONE OF OUR READERS is obviously a Republican with an insecticidal (and Democraticidal) bent. He suggests that the $5-million repair job now being done on the White House include treatment for protection against Third-Termites.

BRITISH FOOD may dull the appetite, but it seemed to sharpen the genial wit of Oliver Grummitt, associate professor of chemistry at Western Reserve University and research consultant to Sherwin-Williams, who recently visited England on business. Writing in his school's alumni magazine, he says, "English food must be the outstanding memory of all post-war visitors. Austerity living and the English genius for maltreating food produced some unforgettable meals. An experience two years ago in the British zone of Germany should have warned me, but I though the complex system in which American army food was cooked by Germans under the direction of an English sergeant was responsible. It is now clear that the food and Germans were blameless."

Getting down to cases, he continued: "The pork sausage must have been formulated by vegetarian Cripps himself—it contained so much cereal that it was a question of whether to use mustard or marmalade."

HOW CHEMICALS got their names is sometimes obvious—like sulfuric acid, from sulfur, nitric acid, from nitrogen, and formic acid, from the Latin word for ants. But did you ever think about barbituric acid—angel of mercy and notorious killer of suicide-bent neurotics?

Baeyer and Swarts—and now we are quoting James Kendall's Baekeland Memorial Lecture—were both research workers in Kekulé's laboratory at the time of the discovery. The chemical staff regularly went for their lunch to a nearby restaurant, which was also the rendezvous of the officers of the local artillery garrison, and friendly relations had been established between the two groups. One day, when the chemists entered, they found the officers already engaged in what was obviously a very special celebration, and were invited to join the party. When they asked the reason for the festivity, it was explained to them that this was Saint Barbara's Day, and Saint Barbara was the patron saint of gunners. After a time Baeyer mentioned in the course of conversation with the commanding officer that he was also feeling particularly happy that morning, because he had just discovered an important new chemical compound. "What are you going to call it?" asked the officer. Baeyer confessed that he had not given any thought to that point so far. "Well, what did you make it from?" was the next question. Baeyer told him that it was a derivative of uric acid. "A derivative of uric acid, and discovered on Saint Barbara's Day," exclaimed the officer. "Its name shall be barbituric acid!" A toast was immediately drunk to the newly christened substance, and barbituric acid it has been called from that moment.

FIFTEEN YEARS AGO

(From Our Files of March, 1934)

Of historic importance is the start of construction of I. C. I.'s great £2,500,000 hydrogenation project at Billingham-on-Tees for the production of gasoline from bituminous coal. It is hoped that hydrogenated gasoline will be on the British market before the end of '34.

General Johnson signs carbon black code to become effective on Feb. 19. Code gives governing authority power to decide upon increases in plant capacity of the industry in any given region at any time such action is considered advisable, subject to approval of the administrator. This power was provided "in the interests of economical use of natural gas and the orderly developments of the carbon black industry," NRA officials said.

Without question many of the most outstanding developments in the textile department of chemical industry during 1933 were connected with wetting, leveling and detergent agents, which are now numerous and comprise compounds of widely differing composition, such as sulfated or sulfonated fatty alcohols, alkylated naphthalenesulfonic acids, highly sulfonated oil or fatty compounds, and phenolic acids.

It is exceedingly doubtful that synthetic rubber will ever replace to any extent natural rubber. Special-purpose synthetic rubbers, however, may be developed and may justify their existence.

THIRTY YEARS AGO

(From Our Files of March, 1919)

In the textile trade a sensation has been caused by the discovery of a method by which cotton fibres can be woven into blankets and similar goods which are just as warm as those made of wool. The success of the experiments was due largely to the discovery of a process which ensures non-conductivity of the cotton.

A despatch from Rome says that large deposits of potash have been found in Sicily. It is said that there is sufficient potash in sight to supply the allied countries for many years.

WE'RE ALL SET to go into business manufacturing women's full-fashioned hosiery out of steel mesh for the Jacksonville, Fla., trade. Perhaps you read in the papers that some mysterious gas in the atmosphere was dissolving nylon hose right off the ladies' legs last month.

It seems to us—being a little rusty on our organic chemistry, learned so many eons ago—that the reaction of coal, air and water to yield nylon must be reversible.

WHAT IN TARNATION is a rare earth? The question came up in our research for the story on Maywood Chemical Works (*p. 380*) and we're still in a thick, swirling fog. One reference applies that term to elements 59-72; another, to elements 58-71; our good friend Partington, to 57-71. We're so confused, we're ready to throw in the sponge and include all of them between hydrogen and plutonium—or do we mean curium?

"They're deciding whether they should recrystallize the product or buy blueing."

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Long life and Hackney 2-Piece Acid Drums are synonymous—thanks to Hackney design and construction. First of all, seamless cold drawn construction means a stronger container. Then, there are no longitudinal or chime seams—just a single circumferential butt weld located between and protected by two I-bar rolling hoops.

Add to this sturdy construction special heavy forged spuds to eliminate bung failures. Then, add reinforced chime protectors for extra strength and prolonged life. And then to increase resistance to corrosion, the finished container is stress relieved in automatic time and temperature controlled furnaces.

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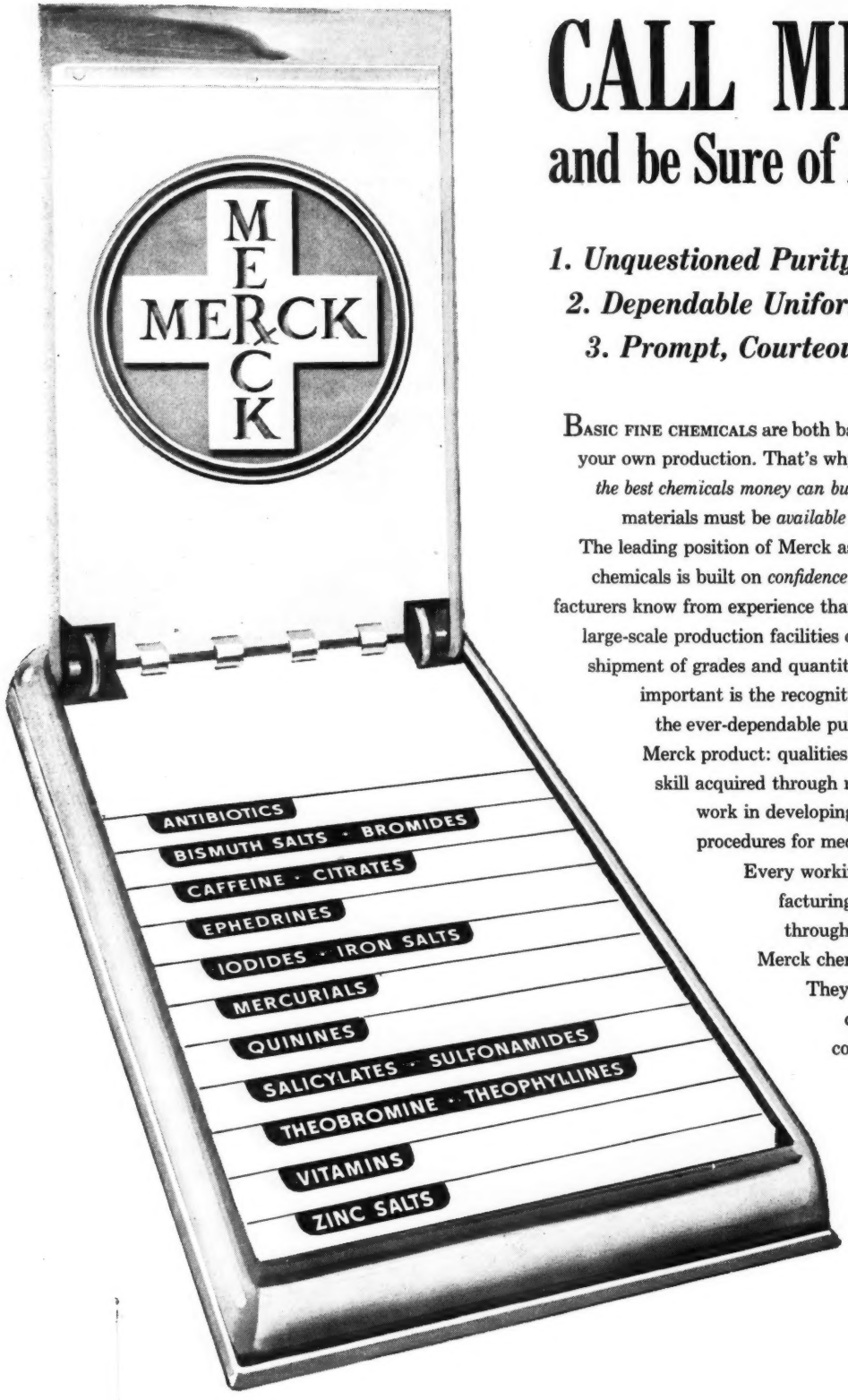

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Abstracts of U. S. and Foreign Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

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U. S. Patents from Official Gazette—Vol. 616, No. 5; Vol. 617, Nos. 1, 2, 3, 4 (Nov. 30-Dec. 28)
Canadian Patents Granted and Published Nov. 30-Dec. 28

*Organic

Benzhydryl amino ethers. No. 2,453,729. George Rieverschl, Jr. (to Parke, Davis & Co.).

Fluid catalytic conversion of naphthalene hydrocarbons into phthalic anhydride. No. 2,453,740. Sam B. Becker (to Standard Oil Co.).

Preparing alkyl halides by contacting a mixture of olefin and hydrogen halide with a thorium salt. No. 2,453,779. Donald C. Bond and Michael Savoy (to Pure Oil Co.).

Production of aliphatic lactones comprising oxidizing a cyclic ether of the group consisting of tetrahydrofuran, tetrahydropyran and 2,5-dihydrofuran. No. 2,453,890. John George Mackay Bremner and David Gwyn Jones (to Imperial Chemical Industries, Ltd.).

Production of the nitric acid esters of nitro-alcohols by reacting a mono-nitro substituted mono-hydroxy alkanol with nitrogen tetroxide. No. 2,453,942. Arthur Ernest Wilder Smith, Charles William Scaife and Harold Baldock, deceased (to Imperial Chemical Industries, Ltd.).

Purification of heterocyclic nitrogen compounds. No. 2,454,019. John Wesley Waldron (to Allied Chemical & Dye Corp.).

Converting an alicyclic aldehyde to an alicyclic acid which comprises contacting with a molten alkali metal hydroxide. No. 2,454,047. Harry de V. Finch, Seaver A. Ballard and Theodor W. Evans (to Shell Development Co.).

2-ethyl-hexyl. N-octadecyl tetrachlorophthalamidate. No. 2,454,061. Mark L. Hill and Herschel G. Smith (to Gulf Oil Corp.).

Crystalline monomeric ether of trimethylomelamine with a monohydric alcohol, said alcohol having at least one hydrogen on the carbinol carbon. No. 2,454,078. Frank Clifton McGrew (to E. I. du Pont de Nemours & Co.).

Alkenyl alkali metal compounds by maintaining an alkali metal compound selected from the group consisting of alkyl sodium and alkyl potassium with a mono-olefinic aliphatic hydrocarbon containing at least 3 carbon atoms. No. 2,454,082. Avery A. Morton (to Research Corp.).

Cleaving the —S—S— group in dialkyl disulfides of the general formula R—S—S—R, wherein the R substituents are alkyl groups, which comprises heating an olefin with such a dialkyl disulfide in the presence of a sulfactive hydrogenation catalyst. No. 2,454,099. Frank K. Signaigo (to E. I. du Pont de Nemours & Co.).

Manufacture of N¹-acyl sulfanilamides which comprises treating sufanilamide with a strong mineral acid of the class consisting of perchloric, chlorsulfonic and sulfuric acids, to form an acid addition product at the p-amino group and subjecting the compound to the action of an acylating agent to form the N¹-acyl derivative. No. 2,454,104. William B. Tarpley, Jr. and August I. Ryer (to Schering Corp.).

Preparing organic sulfides by reacting an organic mercaptan which, except for the sulfur of the mercapto group, consists of carbon and hydrogen with an aliphatic ester of a long chain fatty acid containing at least one olefinic double bond in the presence of elementary selenium. No. 2,454,108. Cheves T. Walling (to E. I. du Pont de Nemours & Co.).

Manufacture of a thiophan derivative, comprising reacting 2-(omega-methoxy-butyl)-thiophan-3,4-dicarboxylic-acidester with hydrazine-hydrate, treating the mother-liquor remaining after separation of crystaline hydrazide with sodium-nitrite, decomposing the resulting acid azide by heating with alcohol to yield the 3,4-diurethane, evaporating the solution under reduced pressure, dissolving the residue in benzene, passing the solution through a column of aluminum oxide, washing with benzene, eluting with chloroform, evaporating to dryness and converting the residue into the dihydrobromide of 2-(omega-bromobutyl)-3,4-diamino-thiphan by heating with hydrobromic acid, reacting the resulting salt with phosgene, successively causing potassium-cyanide and a saponifying agent to act on the resulting reaction product and isolating the resulting 2-(omega-carboxy-butyl)-3,4-(imidazolidone-2')-thiophan in crystalline form. No. 2,454,217. Otto Schnider and André Grussner (to Hoffmann-La Roche Inc.).

Stabilized organic peroxide composition consisting of a single phase liquid mixture of an alkyl ester of phthalic acid and an organic peroxide of the formula RCOOOCR' where R is a straight chain unsubstituted alkyl radical and R' is a radical selected from the class consisting of (a) straight chain unsubstituted alkyl radicals and (b) hydrocarbon monocyclic aryl radicals. No. 2,454,254. Robert Kuoch and Edward S. Shanley (to Buffalo Electro-Chemical Co., Inc.).

Metal mercaptides of amino-aryl mercaptans. No. 2,454,260. Norbert Steiger (to Hoffmann-La Roche Inc.).

3,5-diamino-4-hydro thiotriazine-1-dioxide. No. 2,454,261. Henry A. Walter (to Monsanto Chemical Co.).

3,5-diamino-4-dihydro thiadiazine-1-dioxide by reacting sulfamide and malonitrile in solution in an alcohol. No. 2,454,262. Henry A. Walter (to Monsanto Chemical Co.).

Manufacture of mixed esters of glycols having plasticising properties by heating a diester of a fatty acid containing 2 to 4 carbon atoms and a substance selected from the group which consists of alkylene and polyalkylene glycols together with an aromatic acid containing a benzene ring as the sole aromatic residue. No. 2,454,274. Arthur John Daly and William Geoffrey Lowe (to Celanese Corp. of America).

Manufacture of a mixed ester of a polyhydric alcohol containing 3 to 6 hydroxyl groups with a fatty acid containing less than 5 carbon atoms and a mono-nuclear mono-carboxylic aromatic acid, which comprises heating the ester of the polyhydric alcohol and the fatty acid in which all the hydroxyl groups of the alcohol are esterified together with the aromatic acid. No. 2,454,275. Arthur John Daly and William Geoffrey Lowe (to Celanese Corp. of America).

Producing acrylonitrile by bringing acetylene with hydrocyanic acid into contact with an aqueous acid reacting solution of a cuprous salt and zinc chloride, said solution also containing a salt of the class consisting of ammonium, amine, and alkali metal salts. No. 2,454,308. Harold S. Davis and Herbert A. Newey (to American Cyanamid Co.).

Process for treating aqueous liquors containing maleic acid for its recovery by bringing said aqueous liquor into contact with a conjugated diene selected from the group consisting of aliphatic alicyclic and oxygen-heterocyclic dienes, agitating said mixture, whereupon said diene condenses with the maleic acid in said liquor with the production of a water-insoluble alicyclic dicarboxylic acid and separating said acid from said liquor. No. 2,454,349. Arthur Schwerdle (to Frank J. Sowa).

Simultaneously carbalkoxylating and metallating an ester of the type:

$$R—CH_2—COOR'''$$

where R is an aryl radical and R''' is a hydrocarbon radical, by mixing said ester with an anhydrous alkali metal alcoholate and a large excess of a dialkyl carbonate whereby one of the hydrogens of the CH_2 group is replaced by a carbalkoxyl group and the other hydrogen is replaced by an alkali metal. No. 2,454,360. Vernon H. Wallingford and August H. Homeyer (to Mallinckrodt Chemical Works).

Producing a substantially colorless diguaiacol hydroxy lactone of the formula $C_{20}H_{22}O_7$ from gasoline-insoluble pine wood resin by forming a solution of said diguaiacol hydroxy lactone containing traces of color bodies in a water-soluble monohydric alcohol containing two to four carbon atoms, crystallizing in the form of an alcoholate, separating, and removing the alcohol of crystallization from said alcoholate. No. 2,454,376. Richard F. B. Cox (to Hercules Powder Co.).

Converting a cis alpha-beta unsaturated dicarboxylic acid to its trans isomer by heating in an aqueous medium in the presence of a compound of the formula $RCSNH_2$, where R is a hydrocarbon group. No. 2,454,385. Louis H. Howland and William F. Brucksch, Jr. (to U. S. Rubber Co.).

Converting maleic acid to fumaric acid by heating the maleic acid in an aqueous solution with 4,5-dimethyl 2-mercaptothiazole. No. 2,454,386. Louis H. Howland and William F. Brucksch, Jr. (to U. S. Rubber Co.).

Converting a cis alhpa-beta unsaturated dicarboxylic acid to its trans isomer by heating in an aqueous medium with a compound containing the structural unit, =NCSN=. No. 2,454,387. Louis H. Howland and William F. Brucksch, Jr. (to U. S. Rubber Co.).

Producing piperazines from alkylene amines by vaporizing a material selected from the group consisting of the alkylene diamines and dialkylene triamines having two terminal primary amino groups and in which the amino groups are each separated by two carbon atoms, and passing the heated vapors over a deamination catalyst whereby cyclization of the alkylene amine is obtained and ammonia is eliminated. The catalyst is selected from the group consisting of the oxides of aluminum, silicon, thorium, titanium and zirconium and mixtures of the same. No. 2,454,404. Harry Fred Pfann and James Kenneth Dixon (to American Cyanamid Co.).

Synthesizing mercaptans by contacting hydrogen sulfide and at least one olefinic hydrocarbon, with a liquid catalyst comprising concentrated hydrofluoric acid. No. 2,454,409. Walter A. Schulze and Willie W. Crouch (to Phillips Petroleum Co.).

Dehydration of methyl ethyl ketone by azeotropic distillation under superatmospheric pressure. No. 2,454,447. William S. Harney, Jr., and Erwin H. Amick, Jr. (to Standard Oil Development Co.).

Mixing naphthalene, aluminum chloride and tetrachlorethane and adding chlorinated paraffin wax, treating the reaction mixture with a hydrolyzing agent, settling and removing the catalyst sludge therefrom, distilling under reduced pressure to obtain a high molecular weight wax-naphthalene condensation product soluble in mineral oils and having pourdepressing and viscosity-index improving properties, and extracting said distillation residue with ethyl acetate. No. 2,454,452. Caleb E. Hodges and Aloysius F. Cashman (to Standard Oil Development Co.).

In a process for producing the iron complex of nitroso-β-naphthol wherein a salt of nitroso-β-naphthol is reacted with an iron salt and the iron complex of nitroso-β-naphthol is precipitated, the improvement which comprises incorporating a water immiscible oleaginous liquid, and thereafter precipitating said iron complex in the absence of dispersing agents and insoluble substrates. No. 2,454,453. William G. Huey and Walter G. Drautz (to General Aniline & Film Corp.).

Preparation of aromatic mono-nitro hydrocarbons which comprises nitrating in the presence of an excess of the aromatic hydrocarbon. No. 2,454,468. Edward H. McArdle (to Standard Oil Development Co.).

Ester of a thioglycol having at least one sulfhydryl group with a higher fatty acid having from 12-18 carbon atoms. No. 2,454,568. Maxwell A. Pollack (to E. F. Drew & Co., Inc.).

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* *U. S. Patents from Vol. 615, No. 4. Vol. 616, Nos. 1, 2, 3, 4. Canadian from Nov. 16-23.*

Fractionation of fats by contacting a fatty oil with a low boiling solvent. No. 2,454,638. John T. Dickinson and Oliver Morfit and Leo J. Van Orden (to M. W. Kellogg Co.).

Purification of guanidine nitrate. No. 2,454,644. Charles E. Funk, Jr. (to American Cyanamid Co.).

Manufacture of alkyl chlorides by passing an acylic aliphatic olefine containing not less than three carbon atoms into sulfuric acid to produce a reaction mixture containing the corresponding alkyl sulfuric esters and free sulfuric acid and a second stage consisting of passing gaseous hydrogen chloride into said reaction mixture separating the resultant alkyl chloride-containing upper layer and recovering the alkyl chloride therefrom, and returning the sulfuric acid to the first stage. No. 2,454,645. Eugen Gottfried Galitzenstein and Cyril Woolf (to Distillers Co., Ltd.).

Fluorodihalo esters of the general formula $CH_2X' \cdot CH'' F \cdot COOCH_3$ wherein X′ and X″ are radicals from the group consisting of bromine and chlorine. No. 2,454,663. Lawrence McGinty (to Imperial Chemical Industries Ltd.).

Impression material comprising water soluble alginate and a green chromic sulfate. No. 2,454,709. Eugene J. Molnar (to Montclair Research Corp.).

Recovery of butyl alcohol, ethyl alcohol and acetone from an aqueous solution which comprises stripping said aqueous solution of said alcohols and acetone withdrawing said alcohols and acetone from said column, introducing the vapors into a second column, withdrawing acetone from the head of said second column, withdrawing a liquid mixture of ethyl alcohol, acetone and water from said second column and withdrawing a mixture of butyl alcohol and water from the bottom of said second column, conducting said liquid mixture of ethyl alcohol, acetone and water into a third column, withdrawing from the head of said third column acetone with a greatly reduced ethyl alcohol content, and withdrawing from the bottom of said third column ethyl alcohol substantially free from acetone. No. 2,454,734. Harold Nunnerley Darlington and Harold Holdsworth (to Commercial Solvents (Great Britain) Ltd.).

Triacetyl, monolauroyl ascorbic acid. No. 2,454,747. David I. Weisblat, Donald R. Myers and Edwin C. Wise (to Upjohn Co.).

Production of monoacetyl tripalmitoyl ascorbic acid by reacting tripalmitoyl ascorbic acid with acetic anyhdride in a substantially anhydrous non-reactive organic medium, in the presence of zinc chloride, and separating monoacetyl tripalmitoyl ascorbic acid from the reaction product. No. 2,454,748. David I. Weisblat and Donald R. Myers (to Upjohn Co.).

A 2.3.5.6.-ascorbic acid tetra-ester of a lower aliphatic acid containing from 2-7 carbon atoms, inclusive. No. 2,454,749. Edwin C. Wise (to Upjohn Co.).

Preparing 2-amino-4-hydroxy-6-methyl pyrimido (4,5-b) pyrazine by treating a 2-amino-4-hydroxy pyrimido (4,5-b) pyrazine having as a substituent at the 6-position the group $—CH_2Y$ in which Y is a nitrogen atom having additional substituents of the group consisting of those constituting tertiary amines and quaternary ammonium compounds with a reducing agent comprising metallic zinc and an alkali whereby the group represented by Y is removed and replaced with hydrogen and thereafter recovering 2-amino-4-hydroxy-6-methylpyrimido (4,5-b) pyrazine. No. 2,454,751. James H. Boothe (to American Cyanamid Co.).

Canadian

Continuous preparation of heterocyclic organic bases containing nitrogen in the ring by reacting in the liquid phase aliphatic aldehydes and ammonia. No. 452,660. Herbert Muggleton Stanley and James Ernest Youell (to The Distillers Co. Ltd.).

Production of derivatives of 4:4-diaminodiphenylsulphone substituted in both amino groups by sulphonated radicals by reacting this substance with a substance selected from the group consisting of saturated alkyl aldehyde containing at least 4 carbon atoms and free from hydroxy substituents, unsaturated alkyl aldehydes containing at least four carbon atoms and free from hydroxy substituents, aryl aldehydes and unsaturated aralkyl aldehydes free from alkyl substituents, in the presence of at least 2 moles of a substance selected from the group consisting of sulphurous acid, aqueous solutions of the bisulphites of alkali and alkaline earth metals and aqueous solutions of the metabisulphites of alkali and alkaline earth metals. No. 452,725. Thomas Anderson Henry and William Herbert Gray (to Wellcome Foundation Ltd.).

Preparing aliphatic polycarboxylic amino acids which comprises reacting an aliphatic amine having at least one replaceable hydrogen atom attached directly to an amino nitrogen atom, with an alkali metal cyanide and a formaldehyde-yielding substance under conditions sufficiently alkaline that there is substantially no hydrolysis of the said cyanide such that for each replaceable hydrogen atom one molecule of said cyanide and one molecule of said formaldehyde-yielding substance are added. No. 452,733. Frederick C. Bersworth.

Reacting the diethyl ester of metallo sec-butylmalonic acid wherein the metal is selected from the group consisting of alkali metals and alkaline earth metals with a substance selected from the alkyl, alkenyl and aralkyl halides and di-sulphates in a reaction medium consisting essentially of dialkyl carbonate. No. 452,872. Vernon H. Wallingford and August H. Homeyer (to Mallinckrodt Chemical Wrks.).

Treating Paraffin wax with chlorine and reacting the resultant chlorinated paraffin wax with phosphorus sesquisulphide. No. 452,901. John C. Zimmer and Arnold J. Morway (to Standard Oil Development Co.).

**Packaging*

Preserving caustic soda in metallic containers from contamination with corrosion products of the metals by applying to the metal surface a priming coat mixed with chlorinated rubber and a compound selected from the group consisting of phenolic resins and long oil alkyd resins, and subsequently applying polystyrene and a relatively smaller proportion of a finely-divided pigment that is substantially inert. No. 2,453,471. John Lyman Switzer and John C. Michalek (to Mathieson Chemical Corp.).

Shipping and storage container comprising a base material and a coating comprising a dry residue of an aqueous dispersion of a water-soluble metal soap, a water insoluble wax, zinc stearate, and a copolymer of the composition consisting of butadiene and acrylonitrile. No. 2,453,880. Byron M. Vanderbilt and Paul T. Parker (to Standard Oil Development Co.).

**Paper and Pulp*

Concentrating waste sulphite liquor with recovery of sulphur dioxide. No. 2,453,775. Laurence R. Beath and Harold S. Hill (to Price Bros. & Co., Ltd.).

Treating lignocellulose by heating in the absence of suspending liquid and in an atmosphere of steam at a temperature at which the lignocellulose is rendered plastic, and simultaneously defibering and incorporating a chemical reagent reactive therewith. No. 2,454,532. Henry E. Walter (to Wood Conversion Co.).

Treating lignocellulose by heating lignocellulose in the absence of suspending liquid and in an atmosphere of steam at an elevated temperature at which the lignocellulose is rendered plastic, and simultaneously defibering the plastic lignocellulose and incorporating a chemical reagent reactive therewith and containing sulfur dioxide in sait-form. No. 2,454,533. Henry E. Walter (to Wood Conversion Co.).

Treating lignocellulose by heating lignocellulose in the absence of suspending liquid and in an atmosphere of steam at an elevated temperature at which the lignocellulose is rendered plastic, and defibering and incorporating alkali-metal hydroxide. No. 2,454,534. Henry E. Walter (to Wood Conversion Co.).

Canadian

Paper base material having a penetration resisting sizing incorporated into its structure and having a coating consisting of discrete silica particles of colloidal size. No. 452,628. Edward Jahoda (to H. P. Andrews Paper Co.).

Utilizing waste alkaline effluents from the pulping of cellulosic materials by causticizing the effluent without the addition of fresh sodium compounds and using the causticized effluent without the addition of fresh chemicals for pulping a further batch of cellulosic material. No. 452,910. Gustav Ullmann (to English Cellulose Derivatives, Ltd.).

Petroleum

Manufacture of motor fuel hydrocarbons by reacting carbon monoxide with hydrogen in the presence of an iron catalyst subjecting the resulting reaction products to a temperature within the range of from 200 to 300° F. and a pressure within the range of 150 to 550 pounds per square inch gauge whereby condensate is formed comprising a hydrocarbon-rich phase and a water-rich phase, withdrawing the hydrocarbon-rich phase and subjecting same to fractionation to separate therefrom a fraction boiling within the range of 100° to 625° F., passing said fraction in vapor phase into contact with a catalyst comprising essentially alumina. No. 2,452,121. James H. Grahame (to Texas Co.).

In the continuous alkylation of isobutane with ethylene in the presence of an alkylation catalyst consisting essentially of a major proportion of anhydrous liquid HF and BF_3, the improvement which comprises maintaining a body of substantially anhydrous liquid HF and hydrocarbons in a liquid filled reaction zone maintained under alkylating conditions continuously introducing a charge of isobutane in liquid phase and ethylene, also continuously introducing along with the hydrocarbon feed into said reaction zone BF_3 continuously discharging a stream of hydrocarbon reaction products and recovering 2,3-dimethylbutane. No. 2,452,166. Herbert E. Vermillion (to Texas Co.).

Method for catalytic cracking of hydrocarbon oils. No. 2,452,172. Herbert B. Willard (to Gulf Oil Corp.).

Polymerization of ethylene by contacting ethylene under polymerizing conditions with a catalyst consisting essentially of silica gel, alumina and a metal selected from the group consisting of nickel and cobalt. No. 2,452,190. Stanford J. Hetzel and Robert M. Kennedy (to Sun Oil Co.).

Polymerization of olefins containing 3 or more carbon atoms per molecule which comprises contacting the olefins with a catalyst consisting of silica gel, alumina and a metal selected from the group consisting of nickel and cobalt. No. 2,452,198. Robert M. Kennedy and Stanford J. Hetzel (to Sun Oil Co.).

Treating hydrocarbon material in the presence of contact material. No. 2,452,569. Eugene J. Houdry (to Houdry Process Corp.).

Production of synthesis gas by introducing simultaneously particles of oil shale and an oxygen-containing gas into the upper portion of a reaction zone; maintaining a temperature in said upper portion of said reaction zone in the range of about 1500 to 3000° F; maintaining a pressure in said reaction zone in the range of about atmospheric and about 500 pounds per square inch. No. 2,452,634. Alfred Clark (to Phillips Petroleum Co.).

Isomerizing normal paraffin hydrocarbons of more than 3 but less than 6 carbon atoms by means of a Friedel-Crafts catalyst in the presence of an aromatic hydrocarbon. No. 2,452,690. Bernard H. Shoemaker (to Standard Oil Co.).

In the production of hydrocarbons, oxygenated hydrocarbons and the like by the catalytic reduction of carbon monoxide with hydrogen in the presence of a solid synthesis catalyst with the accompanying formation of water, the improvement which comprises passing said reactants in contact with said catalyst in a reaction zone under an elevated temperature and pressure effective for conversion of the reactants into desired products of reaction, maintaining said contact to effect a substantial degree of conversion, introducing a desiccant material which chemically combines with the water produced in the reaction zone to form a compound. No. 2,452,712. Harold V. Atwell (to The Texas Co.).

Treating a light petroleum fraction to reduce the mercaptan sulfur content by contacting the petroleum fraction with an aqueous alkali metal hydroxide to which there has been added a solubility promoter other than tannic acid, and a small amount of tannic acid. No. 2,453,067. John Happel and Stephen P. Cauley (to Socony-Vacuum Oil Co., Inc.).

Oxidized asphalt product. No. 2,453,094. Robert B. Killingsworth, Harry T. Van Horn and Wallace E. Spelshouse (to Socony-Vacuum Oil Co., Inc.).

Deleading gasoline by adding stannic chloride and then treating with a tertiary-amine-treated charcoal. No. 2,453,138. Morris S. Kharasch (to U.S.A. by Sec. of War).

Cracking normally liquid hydrocarbon material to form high octane gasoline by contacting with a surface active mass consisting of silica and urania. No. 2,453,152. George Alexander Mills (to Houdry Process Corp.).

Semi-solid to solid lubricating grease comprising lubricating oil and acetylene black. No. 2,453,153. Arnold J. Morway and John C. Zimmer (to Standard Oil Development Co.).

Controlled fractional distillation of petroleum. No. 2,453,205. Patrick Docksey (to Anglo-Iranium Oil Co., Ltd.)).

In a process for treating hydrocarbons in which a hydrocarbon is contacted with a catalyst consisting of an alumina carrier and a minor proportion of an activating oxide of a metal of the left-hand columns of groups V and VI of the periodic table. No. 2,453,327. Edwin T. Layng and Frank T. Suman, Jr. (to M. W. Kellogg Co.).

Continuous process of forming carbon black from an endothermic hydro-

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** U. S. Patents from Vol. 615, No. 4. Vol. 616, Nos. 1, 2, 3, 4. Canadian from Nov. 16-23.*

carbon gas. No. 2,453,440. Charles Kaufmann and Ronald H. Hall (to Shawinigan Chemicals Ltd.).

Extracting and purifying bitumen. No. 2,453,633. Victor R. Logan.

Producing a stable colloidal fuel containing pulverized carbonaceous material, finely divided coke particles of petroleum origin. No. 2,453,-641. Carl S. Reed (to Lummus Co.).

Producing a high rich mixture rating motor fuel, a very high percentage of which consists of trimethyl pentanes, which process comprises continuously treating isobutane with a butene in the presence of a liquid acid alkylation catalyst. No. 2,453,765. Donald G. Stevens (to Standard Oil Co.).

Separating butadiene from a mixture of hydrocarbons containing butadiene and acetylenes by contacting with an ammoniacal cuprous salt solution. No. 2,453,853. Charles E. Morrell and Miller W. Swaney (to Standard Oil Development Co.).

Forming normally liquid hydrocarbons by forcing a mixture of carbon monoxide and hydrogen through a dense suspension of powdered synthesis catalyst and a powdered dehydration catalyst. No. 2,453,874. Sumner B. Sweetser (to Standard Oil Development Co.).

Decolorizing a deoiled asphalt-wax mixture obtained as tank bottoms from crude oil storage. No. 2,453,933. Paul L. Polizzotto and Peter Stanley Backlund (to Union Oil Co. of Calif.).

Isomerization of normal butane by mixing a charge of normal butane with hydrogen chloride, passing the normal butane-hydrogen chloride mixture through a solid aluminum chloride. No. 2,454,149. Leslie U. Franklin and Charles F. Plumhoff (to Gulf Oil Corp.).)

Combination isomerization and hydrogenation process. No. 2,454,171 Harold J. Hepp (to Phillips Petroleum Co.).

Production of normally liquid low boiling hydrocarbons from heavier hydrocarbons by cracking comprising contacting with a calcined composite of precipitated hydrous silica containing deposited zirconia and berylia. No. 2,454,369. John R. Bates (to Houdry Process Corp.).

Breaking a petroleum emulsion of the water-in-oil type by treating with a petroleum sulphonic acid body having an amino derivative attached to the hydrocarbon nucleus. No. 2,454,382. John L. Harlan (to Standard Oil Development Co.).

Refining hydrocarbon distillate containing mercaptans, hydrogen sulfide and an amount of carboxylic acids such that objectionable foaming occurs in contacting of the distillate with caustic solution to remove the mercaptans, which comprises treating said distillate with a solution comprising a mixture of barium hydroxide and caustic to remove hydrogen sulfide and carboxylic acids, and thereafter treating with a caustic solution to remove mercaptans. No. 2,454,383. Jacob Benjamin Heid (to Universal Oil Products Co.).

Breaking emulsions of the water-in-oil type, by the action of a demulsifying agent comprising an oxyalkylated drastically-oxidized treated cashew nutshell liquid. No. 2,454,435. Melvin De Groote and Owen H. Pettingill (to Petrolite Corp., Ltd.).

Removing olefins from aromatic hydrocarbons. No. 2,454,467. Robert M. Love (to Standard Oil Development Co.).

Cracking hydrocarbon oils heavier than gasoline to form gas and gasoline including low boiling isoparaffinic hydrocarbons while simultaneously forming tar, which comprises subjecting said oils to the action of hydrofluoric acid. No. 2,454,615. John A. Ridgway, Jr. and Philip Hill (to Pan American Refining Corp.).

Desalting brine-containing oleaginous liquids comprising passing a brine-containing oleaginous liquid through a bed of fiber glass. No. 2,454,-605. Chalmer G. Kirkbride and Mark C. Hopkins (to Pan American Refining Corp.).

Canadian

Production of hydrocarbon products having the properties of safety fuels by treatment in the vapour phase with hydrogen or gases containing hydrogen in the presence of catalysts, comprising compounds selected from the class comprising sulphides and oxides of the metals of the 5th and 6th group of the periodic system. No. 452,689. Mathias Pier, Paul Herold and Hermann Kaufmann (to N. V. Internationale Hydrogeneeringsoctrooien Maatschappij).

Absorbing methane in at least one organic absorbent liquid under pressure, subjecting the resultant fat liquors to a higher pressure and then at an increased temperature only sufficiently high to effect a substantial phase separation between the methane and absorbent liquid, conducting the methane under the ultimate pressure to a reaction chamber and reacting with at least one constituent derived from petroleum. No. 452,709. Francis R. Russell (to Standard Oil Development Co.).

Catalytically cracking a hydrocarbon oil to produce high octane gasoline hydrocarbons by heating and subjecting to momentary contact with a solid catalyst substantially non-volatile, comprising aluminum fluoride hemi-hydrate, such that there is substantial conversion of the oil into gasoline hydrocarbons of high octane value with relatively small carbon formation. No. 452,713. Preston Lenard Veltman (to Texaco Development Corp.).

**Photographic*

Multilayer photographic element having a mixed grain emulsion and process employing it. No. 2,452,765. Edward B. Knott and Guy William Willis (to Eastman Kodak Co.).

Photographic developer containing a developing agent and a fog inhibiting amount of tetrazoyly disulfide. No. 2,453,087. Fritz Dersch and Robert H. Clark (to General Aniline & Film Corp.).

Forming a ferric oxide image in a silver halide emulsion layer by exposing and developing with an alkaline solution of a soluble ferrous salt and a soluble oxalate in an oxygen free atmosphere. No. 2,453,323. Thomas H. James (to Eastman Kodak Co.).

Stabilization of processed photographic emulsions to high temperatures and humidities, with a compound selected from the class consisting of compounds containing sulfur doubly bonded to a single carbon atom and SH linkages bonded to a carbon atom which does not react readily with metallic silver and which forms a light-inert silver complex by reaction with undeveloped silver halide. No. 2,453,346. Harold D. Russell (to Eastman Kodak Co.).

Stabilization of photographic prints with thiophenols. No. 2,453,347. Harold D. Russell (to Eastman Kodak Co.).

Developing a colored image in a silver halide emulsion layer by developing it with a primary aromatic amino developing agent in the presence of a coupler compound having the formula: XY—CH—N=N—R' where X and Y are negative groups selected from the class consisting of —COR, —COOR, —COCOR, —COCOOR, —CONHR, —$C_6H_4NO_2$, and —CN, R is selected from the class consisting of alkyl, aryl, and heterocyclic groups and R' is selected from the class consisting of aromatic and heterocyclic radicals. No. 2,453,661. Dudley B. Glass, Paul W. Vittum and Arnold Weissberger (to Eastman Kodak Co.).

Photosetting coating composition containing a photosetting promoter and a compound having in its molecule at least 2 radicals of the group consisting of eleostearate and keto eleostearate radicals and from which compound a substantial amount of substances having a vapor pressure greater than that of eleostearin have been removed. No. 2,453,769. Gerald L. Wendt (to Sun Chemical Corp.).

Photosetting coating composition containing a photosetting promoter and, as essential ingredients not less than 20% of a compound having in its molecule at least 2 radicals of the group consisting of the eleostearate radical and the keto eleostearate radical. No. 2,453,770. Gerald L. Wendt (to Sun Chemical Corp.).

Control of contrast with aromatic diamine color developers. No. 2,454,-001. Fritz W. H. Mueller (to General Aniline & Film Corp.).

Gelatino-silver halide photographic elements containing higher fatty alcohols. No. 2,454,043. W. H. Dimsdale & K. Challis (to Ilford, Ltd.).

**Polymers*

Preparing polymers by auto-esterifying a mixture of substantially pure monohydroxystearic acid and a substantial amount of substantially pure ricinoleic acid. No. 2,452,092. Waldo C. Ault and Benjamin B. Schaeffer (to U.S.A. by Sec. of Agriculture).

Resinous heteropolymer of isopropenyl acetate and maleic anhydride. No. 2,452,165. Cornelius C. Unruh and William O. Kenyon (to Eastman Kodak Co.).

Loading the voids of uncomminuted porous materials with urea-formaldehyde reaction products. No. 2,452,200. Hamline M. Kvalnes and Franklin S. Chance (to E. I. du Pont de Nemours & Co.).

Plastic composition comprising cellulose ether and a plasticizer, said plasticizer consisting of bis (allyl lactate)-maleate. No. 2,452,209. C. Rehberg and C. H. Fisher (to U.S.A. by Sec. of Agriculture).

Producing a resinous organic condensation reaction product comprising heating a mixture of acrolein, an anacardic material selected from the group consisting of cashew nut shell liquid and its polymers, distillates of cashew nut shell liquid and their polymers, residues of cashew nut shell liquid and their polymers and a condensing agent. No. 2,452,3/4. Mortimer T. Harvey (to The Harvel Corp.).

Hydrolyzing a liquid dimethyldihalogenosilane which comprises pouring onto a hydrolysis medium consisting of a finely-divided, solid, inorganic compound selected from the class consisting of hydrated inorganic salts in which the anion is unpolymerized, and metal hydroxides other than the hydroxides of the alkali and alkaline-earth metals, thereby to produce an aqueous phase and an oily phase containing the methylpolysiloxane hydrolysis product, and recovering the methylpolysiloxane hydrolysis product. No. 2,452,416. James G. E. Wright (to General Electric Co.).

Production of moulding stock of high resistance to alkaline solutions and of high impact strength, which comprises heating phenol and acetaldehyde in the presence of an acid catalyst to obtain a thermo-setting condensation product, dissolving in a volatile solvent, mixing with fibrous asbestos, a mould lubricant, and hexamethylenetetramine, removing the bulk of said volatile solvent by evaporation under reduced pressure. No. 2,452,420. John Allan (to Celanese Corp. of America).

Flux coated electrode having as a binding agent in the coating an organo-silicon polymer. No. 2,452,493. Ernest Clarence Rollason and Ernest Horace Sebastian van Someren (to Metal & Thermit Corp.).

In the copolymerization of a polyester taken from the class, consisting of diethylene glycol maleate, triethylene glycol maleate, tetraethylene glycol maleate, hexamethylene glycol maleate, diethylene glycol chloromaleate, 2 ethyl 1, 3 hexanediol maleate and 2,3 butanediol maleate with an ethylenic unsaturated compound copolymerizable with such polyester in the presence of an organic peroxide as a catalyst, the method of accelerating the copolymerization comprising conducting the same in the presence of an organic peroxide and a compound of the group triethanolamine, triisopropanolamine and methyl diethanolamine. No. 2,452,669. Max M. Levine (to Cornell Aeronautical Laboratory, Inc.).

Flexible abrasive-coated article comprising a flexible backing having abrasive particles secured thereto by the reaction product of a mixture comprising a soluble alkali silicate and a water-soluble, heat hardenable reaction product of an aldehyde and a urea compound. No. 2,452,793. Norman P. Robie (to The Carborundum Co.).

Oil-soluble resin of low acid number comprising the heat-reaction product of rosin and a copolymer of vinyl acetate with an alpha-unsaturated carboxylic acid ester containing more than 5 carbon atoms. No. 2,452,870. John B. Rust and William B. Canfield (to Montclair Research Corp. and Ellis-Foster Co.).

Linear silmethylenesiloxane. No. 2,452,895. Ben A. Bluestein (to General Electric Co.).

Making a sulfur dioxide-olefin resin which comprises reacting a mixture of 50% propylene, 33% butene-2 and 17% butene-1 with liquid anhydrous sulfur dioxide. No. 2,453,039. Allison K. Scribner and Frank W. Wilder (to Phillips Petroleum Co.).

Stratified film comprising a plurality of strata each containing a polyvinyl chloride resin, one of the said strata containing polypropylene glycol sebacate as a plasticizer, and the other strata containing chlorinated paraffin as a plasticizer for the resin. No. 2,453,052. Howard A. Van Etten (to E. I. du Pont de Nemours & Co.)

Thiophene-aldehyde synthetic resins. No. 2,453,085. Philip D. Caesar and Alexander N. Sachanen (to Socony-Vacuum Oil Co., Inc.).

Alkyl thiophene-aldehyde synthetic resins. No. 2,453,086. Philip D. Caesar (to Socony-Vacuum Oil Co., Inc.).

Polymerizing cyclic diorganosiloxane to higher molecular weight polymers by reacting at least one cyclicdiorganosiloxane selected from the group consisting of dialkysiloxsanes and alkylarylsiloxanes with an alkali metal salt of a triorgano silanol. No. 2,453,092. James Franklin Hyde and Oscar Kenneth Johannson (to Corning Glass Works).

Foils and films of polymeric N-vinyl pyrrole from chloroform. No. 2,453,-097. Michael T. Orinik (to General Aniline & Film Corp.).

Polyesters of dimethylene d-gluconic acid. No. 2,453,150. Charles L. Mehltretter (to U.S.A. by Sec. of Agriculture).

Copolymers of dialkenyl arylphosphonates with vinyl acetate. No. 2,453,-167. Arthur Dock Fon Toy (to Victor Chemical Works).

Copolymers of alkenyl arylphosphonates with methyl methacrylate. No. 2,453,168. Arthur Dock Fon Toy (to Victor Chemical Works).

Sealing and potting composition consisting of tri(p-tertiary butyl phenyl) phosphate and coumarone-indene resin. No. 2,453,174. Howard Edwards Wright, Jr.

Hot-water treatment of vinyl resin light-polarizing sheet. No. 2,453,186. Frederick J. Binda (to Polaroid Corp.).

Treating the ligninic residue of the hydrolyzation of the carbohydrates of wood, which comprises mixing with alkali and heating until the residue has substantially resinified. No. 2,453,213. Eduard Farber (to Timber Engineering Co.).

Thermoplastic composition comprising ethyl cellulose, mineral oil, and a resin hard and solid at room temperature and compatible with the ethyl cellulose but relatively insoluble in the mineral oil. No. 2,453,214. Hans G. Figdor (to E. F. Houghton & Co.).

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Synthetic resins by reacting an alkyl benzene, a phenolic compound and a dihaloalkane in the presence of a Friedel-Crafts metal halide catalyst. No. 2,453,298. Herman S. Bloch (to Universal Oil Products Co.).

Composition of matter comprising a polyvinyl butyraldehyde acetal resin, dibutyl sebacate, the ethyl ether of trimethylol melamine and monoethyl phsophoric acid. No. 2,453,308. Richard D. Dunlop (to Monsanto Chemical Co.).

Copolymer of isopropenyl acetate and vinyl chloride. No. 2,453,317. Rudolph Leonard Hasche and Edward M. McMahon (to Eastman Kodak Co.).

Preparing a resinous material by heating a mixture of polylactylic acids, fatty drying oils, and a member selected from the group consisting of fumaric acid, maleic anhydride, and mixtures of fumaric acid and maleic anhydride. No. 2,453,559. Paul D. Watson (to U.S.A. by Sec. of Agriculture).

Composition of matter comprising a solid, elastic, curable methylpolysiloxane consisting of methyl radicals and silicon and oxygen atoms, having incorporated therein an amount of a zirconyl nitrate sufficient to effect curing of the elastic product. No. 2,453,562. James G. E. Wright (to General Electric Co.).

Composition comprising a polyvinyl acetal resin derived from a polyvinyl ester in which at least 30% of the ester groups have been replaced by acetal groups and not more than 50% of the ester groups have been replaced by hydroxyl groups, sulfur and a blown ester of a polyhydric alcohol and a poly-unsaturated aliphatic acid. No. 2,453,569. Max O. Debacher (to Monsanto Chemical Co.).

Composition comprising a polyvinyl acetal resin, a partial ester of a non-resinous polyhydric alcohol and a poly-unsaturated aliphatic acid. No. 2,453,570. Max O. Debacher (to Monsanto Chemical Co.).

Composition for coating webs by hot-melt technique which comprises polyethylene thermoplastic, hydrocarbon thermoplastic terpene resin, chlorinated diphenyl resin, paraffin. No. 2,453,644. W. C. Steinkraus.

Vinyl carboxylate polymerization using a thiourea stopper. No. 2,453,655. Harold W. Bryant (to E. I. du Pont de Nemours & Co.).

Cation-exchange resins made by condensing a sulfophithalein and formaldehyde. No. 2,453,687. Stanley P. Rowland (to Rohm & Haas Co.).

Furfuryl alcohol-phenolic resins. No. 2,453,704. Andrew P. Dunlop and Edward A. Reineck (to Quaker Oats Co.).

In a process for polymerizing a substance selected from the class consisting of esters and nitriles of acrylic and methacrylic acids, the step of initiating the polymerization of the substance by means of potassium meta-bisulphite. No. 2,453,788. Leonard Fallows and Eric Vernon Mellers (to Celanese Corp. of America).

Alpha-acetoxymethyl acrylonitrile polymers. No. 2,453,824. Thomas F. Wood (to U. S. Rubber Co.).

Urea-formaldehyde-alkyd insulating composition. No. 2,454,187. Charles B. Leape and Frank A. Sattler (to Westinghouse Electric Corp.)

Modifying vinyl chloride-vinylidene chloride copolymers with phenol formaldehyde resins. No. 2,454,209. Thomas H. Rogers, Jr., and Robert D. Vickers (to Wingfoot Corp.).

Moldable resinous reaction product consisting of pentaerythritol, maleic acid and phthalic acid. No. 2,454,210. Robert H. Runk and Robert D. Jerabek (to Westinghouse Electric Corp.).

Molding powder, comprising one part of a solid polymer consisting of a polymerized vinyl aromatic compound taken from the group consisting of styrene, ring-substituted alkyl styrenes, ring-substituted chlorostyrenes and vinyl naphthalene, blended with a pulverulent, incompatible, infusible, insoluble aldehyde-aminotriazine resin. No. 2,454,250. Lawrence M. Debing (to Monsanto Chemical Co.).

Composition consisting of polystyrene resin and chlorinated meta deiphenyl benzene. No. 2,454,255. Joseph R. Mares (to Monsanto Chemical Co.).

An interpolymer of a polyhydric alcohol **mixed ester** of a monocarboxylic acid containing an ethylenic double bond, $\alpha\beta$ to the carboxyl group and at least one other ethylenic double bond conjugated therewith and a monofunctional monocarboxylic acid of the group which consists of natural drying oils, semi-drying oils and a monomeric polymerizable member of the group which consists of vinylidene compounds containing a single $CH_2{=}C<$ radical and saturated alcohol esters of butenedioic acids. No. 2,454,294. John C. Sauer (to E. I. du Pont de Nemours & Co.)).

Reacting conjugated dienes with 1,2 unsaturated aliphatic carboxylic acid by contacting in the presence of a polar solvent. No. 2,454,351. Frank J. Sowa and Arthur Schwerdle (to Frank J. Sowa).

Vulcanizate of a mixture of the thermoplastic interpolymer produced by polymerizing styrene while in aqueous emulsion and then adding monomeric butadiene to the emulsion of substantially fully polymerized styrene and polymerizing the butadiene while dispersed in the emulsion. No. 2,454,486. George William Stanton and Charles Everett Lowry (to Dow Chemical Co.).

Neutralized polymeric condensation products obtained by condensing aldehydes with aminotriazines, and with compounds containing at least one alcoholic hydroxy group. No. 2,454,495. Gustave Widmer, Theodor Sutter, Willi Fisch, and Ernst Hochuli (to Ciba Products Corp.).

Preparing millable, moldable, crumblike curable thermoplastic material by mechanically working and heating until a crumb is formed, a mixture of a peroxidic curing catalyst and a linear, unsaturated thermoplastic non-crystalline polyester, said ester being the product of condensing a saturated unsubstituted glycol, a saturated unsubstituted dicarboxylic acid containing a minimum of 4 carbon atoms, and an unsubstituted α, β-unsaturated dicarboxylic acid. No. 2,454,539. Ellington M. Beavers (to Rohm & Haas Co.).

Product comprising polyvinyl formal and a reaction product of a hydrocarbon diisocyanate and a linear polymer selected from the class consisting of polyesters containing recurring intralinear carboxylic ester groups and polyester-amides containing recurring intralinear carboxylic ester groups and recurring intralinear carbonamide groups. No. 2,454,678. Walter Fairbairn Smith and Henry George White (to Imperial Chemical Industries, Ltd.).

Copolymers of hydrocarbon dienes and acrylates of alpha-hydroxy-methylethano-9,10-dihydroanthracene. No. 2,454,737. Earl W. Gluesenkamp and Alfred B. Craig (to Monsanto Chemical Co.).

Copolymer of methyl acrylate and furfuryl acrylate. No. 2,454,756. C. E. Rehberg and C. H. Fisher (to U. S. A. by Sec. of Agriculture).

Canadian

Modifer for polyvinyl resins comprising the distillate obtained by distilling polymerized alpha-methyl para-methyl styrene. No. 452,911. Sidney J. Baum and Walter D. Paist (to Camille Dreyfus).

Continuous method of making vinylidene chloride polymer tubing. No. 452,846. Wilbur T. Stephenson (to Dow Chemical Co.).

*Processes and Methods

Catalyst transfer system. No. 2,453,458. Carl S. Reed, August Henry Schutte and Vernon O. Bowles (to Lummus Co.).

Fluidized catalyst regeneration process which includes over head cooling. No. 2,454,373. F. H. Blanding (to Standard Oil Development Co.).

Regeneration of fluid catalysts with cooling of flue gases by water injection. No. 2,454,466. E. J. Le Roi (to Standard Oil Development Co.).

Canadian

Rectification process for effecting the low temperature separation of a compressed gaseous mixture. No. 452,636. Robert Cowell Godfrey (to The British Oxygen Co., Ltd.).

*Rubbers

Preparing a substantially unmasticated reinforced rubbery material of the organic-polysulfide type, which comprises combining carbon black with a reactive liquid organic compound having connected to each of 2 carbon atoms connected by intervening structure a substituent group capable of being split off by a reaction with an aqueous solution of a water-soluble polysulfide to produce a rubbery reaction product. No. 2,452,083. Theodore A. Te Grotenhuis.

Manufacturing gas expanded rubber which comprises forming a rubber mix free from any vulcanizing agent heating to expand the same fully to its final shape; thereafter reducing the gas pressure and adding a vulcanizing agent including sulphur compounds to the expanded rubber and vulcanizing the rubber. No. 2,452,347. Roger Charles Bascom (to Rubatex Products, Inc.).

Vulcanizing synthetic rubber with dixanthic sulfides. No. 2,453,689. David J. Beaver (to Monsanto Chemical Co.).

Obtaining rubber from goldenrod leaves. No. 2,453,858. Nandor Porges, Elisha F. Pollard and James J. Spadaro (to U.S.A. by Sec. of Agriculture).

Combined bituminous and rubber composition compounded of rubber, asphaltic material having a melting point of about 170°F. to 180°F., a plasticizing agent, an asphaltic material of a different grade, a mineral filler, and a flow retarding agent. No. 2,454,506. Albert C. Fischer.

Making rubber-like materials by reacting an aliphatic thioaldehyde with elementary sulfur. No. 2,454,635. Cecil Albert Curtis and Douglas Sandford Stephens.

Producing 4-pyridazones by heating in the presence of an aqueous solvent-diluent an azo dye the coupling component of which is a pyronone and the aromatic diazo component of which is free from sulfonic acid groups. No. 2,454,742. Jack F. Morgan (to General Aniline & Film Corp.).

Synthetic rubber which comprises a copolymer of a conjugated hydrocarbon diene and a dicyclopentadienyl alcohol ester of an acid of the group consisting of acrylic acid and methacrylic acid. No. 2,454,743. David T. Mowry and Alfred B. Craig (to Monsanto Chemical Co.).

Canadian

Vulcanizing a rubber by heating rubber and sulphur in the presence of a condensation product of a 2-mercapto-thiazole, formaldehyde and ammonia. No. 452,878. Marion Wesley Harman (to Monsanto Chemical Co.).

*Specialties

Fire-retardant composition comprising urea, a source of formaldehyde, a carbohydrate and a foam-forming ingredient selected from the group consisting of monoammonium phosphate, diammonium phosphate, phosphoric acid, ammonium sulfate, sulfamic acid, ammonium sulfamate, ammonium bromide, sodium tungstate, sodium borate and boric acid. No. 2,452,054. Grinnell Jones, Walter Juda and Samuel Soll (to Albi Mfg. Co., Inc.).

Fire-retardant composition for surface application to combustible materials which comprises an aqueous suspending medium having dispersed therein, as the principal ingredients, an activator selected from the group consisting of ammonium phosphate, ammonium borate, ammonium sulfate, and ammonium sulfamate, and an amylaceous substance. No. 2,452,055. Grinnell Jones, Walter Juda and Samuel Soll (to Albi Mfg. Co., Inc.).

Obtaining granular crystals of sugarcane wax, comprising inducing crystallization by slowly cooling over a period of several hours, a molten crude sugarcane wax and wax-solvent mixture to obtain a solid phase of granular wax crystals and a liquid phase consisting of a solution of the fatty fraction of crude wax in the wax solvent. No. 2,452,093. Royal T. Balch (to U.S.A. by Sec. of Agriculture).

Fluid composition composed of a mixture of liquid polymeric dimethyl silicones having two methyl radicals attached to each silicon atom. No. 2,452,254. Rob Roy McGregor and Earl Leathen Warrick (to Corning Glass Works).

Lubricating oil composition having superior anti-oxidant and anti-rusting properties in the presence of water comprising a hydrocarbon oil possessing lubricating properties and an alkyl substituted diamino diphenylmethane, an oil-miscible dicarboxylic acid having at least 10 carbon atoms, and oil-miscible alkyl acid phosphate containing at least 10 carbon atoms in the alkyl portion thereof. No. 2,452,319. John A. Patterson and Herman D. Kluge (to The Texas Co.).

Lubricating composition having superior anti-oxidant properties in the presence of water comprising a mineral lubricating oil, an oil-miscible alkyl maleic acid having at least 10 carbon atoms in the molecule, and an alkyl substituted diamino diphenyl alkane, wherein the said alkyl substituent contains from 1 to 5 carbon atoms and the said alkane is selected from the group consisting of methane and ethane. No. 2,452,320. Herman D. Kluge and John A. Patterson (to Texas Co.).

Preventing rust formation of metal surfaces in the presence of salt water by applying an oleaginous vehicle having incorporated therein an oil-miscible dicarboxylic acid containing at least 10 carbon atoms, and an alkyl acid phosphate in which the alkyl portions thereof contain a total of at least 10 carbon atoms. No. 2,452,321. Herman D. Kluge and John A. Patterson (to The Texas Co.).

Stabilizing gasoline fuels containing tetra-ethyl lead by addition of dialkyl sulphate. No. 2,452,489. William Arthur Partridge and Harold John Alty (to Anglo-Iranium Oil Co., Ltd.).

Mineral oil composition resistant to foaming comprising a mineral oil and a salt-forming constituent selected from the class consisting of metals and an organic ammonium group derived from the class consisting of heterocyclic nitrogen bases and N-dialkarylamines and the viscous liquid reaction product of heating at a temperature not exceeding 300° F. 1 mol of a glycol having from 2 to 6 carbon atoms, 1 molar equivalent of a phosphorous compound selected from the class consisting of phosphorous oxychloride and phosphorous pentoxide and a saturated aliphatic

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* *U. S. Patents from Vol. 615, No. 4. Vol. 616, Nos. 1, 2, 3, 4. Canadian from Nov. 16-23.*

monohydric alcohol having from 1 to 18 carbon atoms. No. 2,452,693. Herschel G. Smith and Troy L. Cantrell (to Gulf Oil Corp.).

Composition for inhibiting foam consisting of a compound selected from the group consisting of di-tertiary amyl phenoxyethanol, p-tertiary amyl phenoxyethanol, and di-tertiary amyl phenoxypropanol and di-tertiary amyl phenoxy isopropanol; and anhydrous sodium carbonate. No. 2,453,351. H. E. Tremain and L. R. Bacon (to Wyandotte Chem. Corp.).

Composition for suppressing the formation of foam in aqueous systems consisting of di-tertiary amyl phenoxy-ethanol, 2-methyl-2, 4-pentanediol, water and a sodium petroleum sulfonate. No. 2,453,352. Henry E. Tremain and Leslie R. Bacon (to Wyandotte Chemicals Corp.).

Liquid composition suitable for insulating and dielectric purposes consisting of normally stable halogenated aromatic hydrocarbon compounds and a fixative for halogen decomposition products consisting of a polycyclic compound containing at least one heterocyclic ring and a plurality of hetero atoms at least one of which is nitrogen. No. 2,453,493. Frank M. Clark and Edward L. Raab (to General Electric Co.).

Composition for the impregnation of paper-spaced capacitors consisting of monochlor fluorenone, dichlor fluorenone and unchlorinated fluorenone. N. 2,453,494. Frank M. Clark (to General Electric Co.).

Ink consisting of a pigment, a mineral oil vehicle, and a petroleum polymer which is fluid at room temperatures, obtained by solvent extraction of solid adsorbents used in the refining of a petroleum hydrocarbon. No. 2,453,558. Andries Voet (to J. M. Huber, Inc.).

Extracting gelatin or glue from collagen or ossein-containing materials having a fat or wax content by treating with a dilute solution of caustic alkali. No. 2,453,630. Joseph Kenyon and Victor Silberstein (to Hatim Attari).

Slushing oil composition consisting of lead-wool grease soap, mineral oil, a higher alcohol ester of an alkali metal sulfo-succinic acid and a low-boiling hydrocarbon liquid. No. 2,453,816. Hans Schindler and Paul T. Anderson (to Pure Oil Co.).

Rust preventing composition consisting of a mineral oil base, a partially volatile corrosion inhibitor consisting of sodium petroleum sulfonates and degras, and a polybutene. No. 2,453,833. William S. Davis, Jr., and Donald L. Wright (to Standard Oil Development Co.).

Improved lubricant composition comprising a mineral lubricating oil and an oil-soluble resinous auto-condensation product of an alkyl hydroxy benzyl amine. No. 2,453,850. Louis A. Mikeska, Allen R. Kittleson and Warren M. Smith (to Standard Oil Development Co.).

Inhibition of corrosion in wells by introducing a corrosion inhibiting amount of carbon disulfide. No. 2,453,881. Prentiss S. Viles and Elza Q. Camp (to Standard Oil Development Co.).

Inhibiting corrosion in wells by introducing a corrosion inhibiting amount of elemental sulfur. No. 2,453,882. Prentiss S. Viles and Elza Q. Camp (to Standard Oil Development Co.).

Sulfurized lubricating composition. No. 2,454,034. Dayton P. Clark, Jr. (to Gulf Research & Development Co.).

Steam turbine oil composition comprising a refined mineral steam turbine lubricating oil and an antioxidant selected from the group consisting of 1-phenyl-3,5,5-trimethyl pyrazoline and 1 - phenyl - 3 - isobutenyl - 5, 5 - dimethyl pyrazoline. No. 2,454,075. Robert G. Mastin (to Cities Service Oil Co.).

Rendering cellulose flame resistant and capable of withstanding repeated wetting with water without substantial loss of flame resistance, which comprises treating the cellulose with an aqueous solution of sodium tungstate and thereafter treating the material with an aqueous dilution of an acid solution of the resin obtained by reacting substantially equimolecular proportions of cyanamide and formaldehyde. No. 2,454,245. Jackson A. Woodruff (to American Viscose Corp.).

Lubricating oil composition comprising a waxy mineral lubricating oil, condensation product derived by condensation of aliphatic nitriles of mixed fatty acids having about 16 to 18 carbon atoms, with naphthalene, in the presence of aluminum chloride and in the presence of inert chlorinated hydrocarbon solvent followed by hydrolysis and removal of the catalyst. No. 2,454,394. Eugene Lieber and Edward P. Cashman (to Standard Oil Development Co.).

Slow aging adhesive consisting of limed rosin, triethylene glycol di-2-ethylbutyrate, ground asbestos and bentonite. No. 2,454,676. Norman A. Skow, Charles J. Seiler, Richard A. Oriani and Joseph S. Whitaker (to U.S.A. as repres. by Secretary of War).

Duplicating ink comprising crystal violet, chrysoidine, brilliant green, rhodamine, basic brown. No. 2,454,700. Melville J. Holik (to Ditto, Inc.).

Non-gelling alkaline earth metal petroleum sulfonate solution in mineral oil which comprises a petroleum hydrocarbon oil, oil soluble alkaline earth metal petroleum sulfonate and one member selected from the group consisting of substantially oil soluble, phthalic acid esters of alkylene glycol ethers and alkyl phthalates in amount sufficient to substantially prevent gelling of said alkaline earth metal petroleum sulfonate-petroleum hydrocarbon solution. No. 2,454,736. Jacob Faust (to L. Sonneborn Sons, Inc.).

Canadian

Adhesive composition comprising starch and dicyandiamide. No. 452,626. Walter G. Kunze and Raymond B. Evans (to Le Page's, Inc.).

Composition of matter comprising an aromatic sulphone and hydrogenated castor oil. No. 452,642. Frank M. Clark (to Canadian General Electric Co.).

Hydraulic fluid consisting of a substantially completely condensed liquid organo-siloxane whose organic substituents consist of mono-valent hydrocarbon radicals attached to silicon through carbon-silicon linkages at least some of said hydrocarbon radicals being alkyl radicals containing less than 3 carbon atoms. No. 452,653. Rob Roy McGregor and Earl Leathen Warrick (to Corning Glass Works).

Composition for shampooing the hair comprising soap, oil of rosemary, and potassium dichromate. No. 452,764. Phyllis Abigail Dora Elliott.

Dielectric material including wood fibre paper loaded with barium strontium titanate powder and a coating of resinous material. No. 452,812. Edward A. Kern and Harry F. Miller (to Canadian General Electric Co., Ltd.).

Adhesive comprising a concentrate consisting essentially of lignosulphonic acid made from waste sulphite liquors, polyvinyl alcohol, and disodium phosphate. No. 452,860. Donald S. Bruce and Howard L. Heise (to Gummed Products Co.).

Bandage comprising a base sheet impregnated with a cast forming composition capable of forming a hard rigid cast structure, said composition having a major portion of a crystalline organic compound with a sharp melting point intimately admixed with a minor portion of a high molecular weight thermoplastic substance compatible with the crystalline compound. No. 452,868. James J. Eberl (to Johnson & Johnson, Ltd.).

*Textiles

Manufacturing high tenacity viscose rayon involving use of a small amount of formaldehyde prior to the high stretching effected in the hot bath. No. 2,452,130. Guillaume M. A. Kayser (to American Enka Corp.).

Production of a textile fabric resistant to penetration by mustard gas and by water, which comprises spreading an aqueous solution of polyvinyl alcohol on a single-layer cellulose fabric. No. 2,452,152. James Henry Rooney, John Henry Sharphouse and Philip Richard Hawtin (to Celanese Corp. of America).

Canadian

Process for producing from filaments of a vinyl resin formed by polymerizing a mixture of vinyl compounds including a vinyl halide, stretched yarns of excellent softness and high "loop-break" strength, by coating two associated freshly spun continuous filaments with finely-divided particles of a solid substantially water-insoluble inorganic compound, which is not compatible with said vinyl resin, while said filaments contain residual volatile spinning solvent, forming yarn, drying and removing residual solvents, and subsequently stretching. No. 452,649. Theophilus A. Feild, Jr., Edward W. Rugeley and John L. Petrokubi (to Carbide and Carbon Chemicals, Ltd.).

*Water, Sewage and Sanitation

Improving the taste and odor of water supplies by contacting with chlorine dioxide. No. 2,452,970. George P. Vincent, James Douglas Mac Mahon and John F. Synan (to Mathieson Chemical Corp.).

In disinfecting water by chlorination the improvement of improving the taste and odor by contacting with chlorine dioxide. No. 2,452,971. George P. Vincent, James Douglas Mac Mahon and John Francis Synan (to Mathieson Chemical Corp.).

Conditioning water in a boiler to render it alkaline but incapable of yielding strong concentrations of caustic soda on evaporation in which the alkalinity is imparted by hydrolytic dissociation of alkali-metal salts selected from the group consisting of secondary and tertiary phosphates, silicates, borates, acetates and fluorides. No. 2,454,258. Wilburn C. Schroeder and Abraham A. Berk (to U.S.A. by Sec. of Interior).

Agricultural

Water wettable, dry, powdered phenothiazine composition comprising phenothiazine, an alkyl benzene alkali metal sulfonate in which the alkyl substituent contains at least 3 carbon atoms, and a water soluble peptizing agent having the following general formula $R_1NR_2R_3$ in which R_1 is selected from the group consisting of hydrogen, hydroxyalkyl, and aminoalkyl, R_2 and R_3 are selected from the group consisting of hydrogen and hydroxyalkyl, and in which R_1 and R_3 when connected together form a six-membered heterocyclic ring selected from the group consisting of oxazines and azines. No. 2,455,054. Lyle M. Geiger and Donald L. Marsh (to The Neville Co.).

Fungicide and insecticide consisting of a cuprammoniacal petroleum mahogany sulfonate, $[Cu(Amm)x]$ $(RSO_3)_2$, in which RSO_3 designates a petroleum mahogany sulfonate radical, in which *Amm* designates an ammoniacal compound capable of entering into the formation of a cuprammoniacal complex compound when in contact with a copper salt, and in which *x* designates the number of *Amm* groups. No. 2,455,687. Leo Liberthson (to L. Sonneborn Sons, Inc.).

Copper fungicide containing a basic copper salt with alumina and fatty acid soap, said basic copper salt being of the group consisting of basic copper sulphate, chloride, nitrite, fluoride, fluorsilicate and lactate. No. 2,456,727. Alexander A. Nikitin (to Tennessee Copper Co.).

Pesticide comprising an alkylnicotinium arylsulfonate and a carrier, said alkylnicotinium arylsulfonate having the general formula $B(RX)_n$, in which B represents nicotine, R represents a monvalent alkyl group, X represents the group aryl—SO_3—, and *n* is an integer not greater than 2, R and X of each RX grouping being linked to the same nitrogen atom of the nicotine nucleus. No. 2,456,851. Charles F. Woodward, Donald H. Saunders and Raymond C. Provost, Jr. (to U. S. A. by Sec. of Agriculture).

Fungicidal composition comprising a water-soluble salt of an alkylene bisdithiocarbamic acid, a water-soluble salt of zinc, and lime. No. 2,457,674. John W. Heuberger (to Rohm & Haas Co.).

Biochemical

Producing a penicillin by sterilizing a solid substrate essentially comprising moist oats, sodium citrate, and calcium carbonate, and growing a penicillin-forming mold thereon. No. 2,457,585. Robert B. McCormack (to E. R. Squibb & Sons).

Canadian

Preparing pure alkali metal salts of penicillin. No. 452,980. Murray Senkus (to Commercial Solvents Corp.).

Preparing pure crystalline potassium and ammonium penicillin salts. No. 452,981. Edward B. Hodge (to Commercial Solvents Corp.).

Cellulose

Cellulose ethers of 3,4 epoxy 1-butene and their oxidation products. No. 2,455,083. David M. Musser (to Pacific Mills).

Stabilized cellulose ester compositions comprising a cellulose derivative selected from the group consisting of cellulose esters of lower fatty acids and nitrocellulose, a plasticizer and benzyl benzoate. No. 2,455,581. Richard M. Hitchens (to Monsanto Chemical Co.).

Cellulose ester stabilization in anhydrous medium. No. 2,456,688. Camille Dreyfus, Robert D. Rowley and Robert F. Thompson (to Celanese Corp. of America).

Canadian

Production of cellulose with digestion in two or more digesters operated simultaneously at different digesting stages, characterized by the fact that steam or a mixture of steam and gas is taken from the top of one or more digesters already under full operating pressure and is supplied into the lower portion of the one or more digesters having still not attained full operating pressure. No. 452,952. Johan Hugo Walling (to Aktiebolaget A. Ekstroms Maskinaffar).

Production of cellulose esters. No. 453,572. Clifford I. Haney, Mervin E. Martin and Thomas E. McGoury (to Camille Dreyfus).

Ceramics

Glass resulting from boron oxide, lanthanum oxide, and fluoride. No. 2,456,033. Kuan-Han Sun (to Eastman Kodak Co.).

Coatings

Protecting a metal surface with a clear resin solution containing about 25% by weight of unpolymerized phenolformaldehyde resin with organic solvent for said resin, to which is added aurine. No. 2,455,114. Emerson Gillmore Cobb (to United Aircraft Corp.).

Producing a resin-free wrinkle finish oil cloth material consisting in heating raw castor oil and dehydrated castor oil; adding drier catalyst; mixing a pigment paste and applying. No. 2,455,540. William A. Waldie (to New Wrinkle, Inc.).

Air drying wrinkle finish coating consisting of a mixture of short oil varnish and an oil drier. No. 2,455,541. William Allshire Waldie (to New Wrinkle, Inc.).

Forming a water-emulsifiable, air drying coating composition from the reaction product of glycerol, rosin and linseed oil, with maleic anhydride. No. 2,455,743. George E. Eilerman (to Pittsburgh Plate Glass Co.).

Strippable coating comprising a polychloroprene and aluminum powder. No. 2,455,854. George E. Conde (to E. I. du Pont de Nemours & Co.).

Strippable coating composition comprising a polychloroprene and a stripping agent selected from the group consisting of soya lecithin, a lead soap of petroleum oil acids, and a stearyl alcohol ester of a styrene-maleic anhydride reaction product. No. 2,455,855. Clyde G. Murphy and John P. Sermattei (to E. I. du Pont de Nemours & Co.).

Strippable coating composition comprising a polychloroprene and carbon black. No. 2,455,856. Clyde G. Murphy and John P. Sermattei (to E. I. du Pont de Nemours & Co.).

Preparing hardened polyvinyl alcohol coatings by incorporating a water-soluble complex consisting of zirconium nitrate, ethylene glycol and an inorganic water-soluble base, coating and drying. No. 2,455,937. Wesley G. Lowe (to Eastman Kodak Co.).

Coating composition comprising an aqueous emulsion of polymerized monomeric methyl acrylate, the viscosity being adjusted by peptized casein and a water-soluble alginate. No. 2,456,295. William C. Mast (to U. S. A. by Sec. of Agriculture).

Drying compounds capable of hardening by air oxidation and by heat treatment to form insoluble and infusible protective coatings, said compounds being synthetic esters of polymeric polyhydric alcohols having alternating aliphatic chains and aromatic nuclei united through ether oxygen, said alcohols containing from 3 to 20 hydroxyl groups, per molecule, esterified with higher fatty acids said esters containing from 6 to 20 double bonds per molecule in the fatty acid radicals. No. 2,456,408. Sylvan Owen Greenlee (to Devoe & Raynolds Co.).

A wrinkle drying coating composition consisting of a conjugated double-bonded fatty oil and a cellulose compound selected from the group consisting of cellulose acetate, ethyl cellulose, and nitrocellulose. No. 2,456,670. Nathan T. Beynon (to New Wrinkle, Inc.).

Manufacturing flexible, wrinkle-coated materials comprising mixing unsaturated fatty oil with varnish solvent and aqueous rubber latex; applying and subjecting the coated material to drying. No. 2,456,671. Nathan T. Beynon (to New Wrinkle, Inc.).

Coating mixture for wire elements which comprises mixing aluminum oxide and water to form a suspension of creamy consistency, adding hydrochloric acid to increase the fluid content by of the order of 10%, and adding the finely divided aluminum oxide to the suspension to increase the solid content by of the order of 50%. No. 2,457,515. John T. Acker (to Bell Telephone Labs., Inc.).

Canadian

Application of polymers and interpolymers of vinyl chloride to surfaces. No. 453,446. George Crawford Pyce (to Canadian Industries, Ltd.).

Detergents and Surface-Active Media

Reducing the viscosity of petroleum mahogany sulfonate solutions by treating with an alkali metal chlorite and an alkali metal hypochlorite. No. 2,454,823. Abraham Moscowitz (to L. Sonneborn Sons, Inc.).

Reducing the viscosity of petroleum mahogany sulfonate solutions by treating with elemental chlorine. No. 2,454,824. Abraham Moscowitz (to L. Sonneborn Sons, Inc.).

Viscosity reduced petroleum mahogany sulfonate solution of a petroleum mahogany sodium sulfonate solution in an organic substantially water immiscible solvent and at least one phthalic acid derivative selected from the group consisting of substantially oil soluble phthalic acid esters of alkylene glycols, phthalic acid esters of alkylene glycol ethers and alkyl phthalates. No. 2,454,825. Jacob Faust (to L. Sonneborn Sons, Inc.).

Reducing the viscosity of petroleum mahogany sodium sulfonate solutions by reacting with an oxidation agent selected from the group consisting of chromic acid dichromates, permanganates, perchlorates and peroxides. No. 2,454,826. Leo Liberthson and Jacob Faust (to L. Sonneborn Sons, Inc.).

Reducing the viscosity of petroleum mahogany sulfonate solutions by treating with chlorine dioxide. No. 2,454,827. Abraham Moscowitz (to L. Sonneborn Sons, Inc.).

Viscosity reduced petroleum mahogany sulfonate solution which essentially consists of a petroleum mahogany sodium sulfonate solution in an organic substantially water immiscible solvent and at least one member selected from the group consisting of substantially oil soluble diethylene glycol and diethylene glycol alkyl ethers. No. 2,454,828. Jacob Faust (to L. Sonneborn Sons, Inc.).

Non-dusting detergent composition consisting of alkyl naphthalene sulfonates in which the alkyl groups contain from 3 to 6 carbon atoms, tetrasodium pyrophosphate and at least one alkali-metal carbonate from the class consisting of soda ash and sodium bicarbonate, together with diethylene glycol stearate. No. 2,455,050. Sidney Eisenberger and Samuel Machlis (to O. D. Chemical Corp.).

Making a detergent composition by adding a material selected from the class consisting of zinc oxide and sodium zincate to aqueous sodium hydroxide and heating to vaporize the water, mixing disodium orthophosphate and then converting the entire mixture to the solid state. No. 2,455,648. Wallis R. Bennett (to Dow Chemical Co.).

Sulfonated fatty acid ester of an aryl hydroxyalkyl ether $(MSO_3)m—X—O—(Y—O)n—CO—R$ wherein M is a positive ion, X is a mononuclear aryl group of the benzene series, Y is an alkylene group containing 2-6 carbon atoms and R is an aliphatic radical selected from the group

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* *U. S. Patents from Vol. 615, No. 4. Vol. 616, Nos. 1, 2, 3, 4. Canadian from Nov. 16-23.*

consisting of the straight chain aliphatic and cycloaliphatic radicals derived from fatty acids containing 10-25 carbon atoms, *m* is 1-2 and *n* is 1-3. No. 2,455,730. John R. Caldwell (to Eastman Kodak Co.).

Preparing a surface active compound comprising condensing indene with benzene in which one hydrogen is substituted with a hydroaromatic radical and sulfonating the resulting product. No. 2,455,811. Hans Schindler (to Pure Oil Co.).

Production of surface active agents by alkylating mononuclear aromatic hydrocarbon containing at least 2 replaceable nuclear hydrogen atoms with an olefinic treated naphtha fraction; sulfonating with suliuric acid to form an aromatic sulfonic acid; separating the resultant sulfonation products and neutralizing the aromatic sulfonic acid content thereof with a basic reagent to form the corresponding aromatic sulfonic acid salt. No. 2,456,119. Bernard S. Friedman and George L. Hervert (to Universal Oil Products Co.).

Non-dusting free-flowing particulate soap comprising spray-dried soap particles having a dry coating of material from the group consisting of starch, gum and glue. No. 2,456,437. Gilbert De Wayne Miles (to Colgate-Palmolive-Peet Co.).

Canadian

Mixture of substituted mononuclear aryl sulphonates which contain as nuclear substituents aliphatic and alicyclic hydrocarbon radicals derived from a liquid fraction of petroleum. No. 452,956. Lawrence H. Flett (to Allied Chemical & Dye Corp.).

In a method of producing sulphonated higher alkyl derivatives of aromatic hydrocarbons, the improvement which comprises heating the condensation reaction mixture at a temperature between 70° and 130° C. for at least one hour after the evolution of hydrogen halide has substantially ceased. No. 453,116. Lawrence H. Flett (to Allied Chemical & Dye Corp.).

Producing a detergent mixture of higher alkyl benzene sulphonates by forming a benzene hydrocarbon condensation product of a polycomponent non-aromatic hydrocarbon mixture of mineral origin and sulphonating the condensation product, the improvement which comprises distilling the benzene hydrocarbon condensation product, collecting a fraction of the distillate containing higher monoalkyl benzene compounds, and sulphonating resulting higher monoalkyl benzene compounds. No. 453,387. Lawrence H. Flett (to Allied Chemical & Dye Corp.).

Condensation of olefin sulphonic acids with aromatic compounds. No. 453,524. Chester Merle Suter (to Procter & Gamble Co.).

Detergent composition comprising an ester of tolyl ethyl alcohol and an alkali metal soap. No. 453,563. Frank Johns Soday (to United Gas Improvement Co.).

Dyes, Pigments

Producing white opacifiers from zirconia which is contaminated with silica and iron by converting zirconia into the monoclinic form by heating in the presence of lithia and cooling and pulverizing. No. 2,455,123. Loren C. Hurd, Allen J. Vander Weyden and James D. Stroupe (to Rohm & Haas Co.).

Colored couplers. No. 2,455,170. Dudley B. Glass, Paul W. Vittum and Arnold Weissberger (to Eastman Kodak Co.).

Cyanine dyestuff. No. 2,455,420. John David Kendall, Harold Gordon Suggate and Henry Walter Wood (to Ilford Ltd.).

Pigment composition comprising a reaction product of a basic polyarylmethane dyestuff with a natural tanning agent, and a water insoluble polyvalent metal salt of at least one soap-forming acid. No. 2,455,898. Walter E. Ness (to American Cyanamid Co.).

Chromed monoazo compound. No. 2,456,230. Willy Widmer (to Ciba Ltd.).

Manufacture of pigments of the phthalocyanine series comprising heating phthalocyanine halogenated in the benzene nuclei with an aromatic mercaptan in presence of an acid binding agent and of an alcohol. No. 2,456,274. Ernst Gutzwiller (to Sandoz Ltd.).

Dyeing nylon-acetate mixed fabric with 3-nitro-4-amino-2'-chlorobiphenyl. No. 2,456,288. Jean G. Kern (to Allied Chemical & Dye Corp.).

Pigment composition of a mixture of discrete particles of non-magnetic flake metal pigment with discrete particles of ferromagnetic metal pigment, said pigment composition containing thin aluminum flake pigment and ferromagnetic metal pigment. No. 2,456,313. Burt Carlton Pratt (to E. I. du Pont de Nemours & Co.).

Paste for printing fabrics made of cellulose with chromium mordant dyestuffs. No. 2,456,471. Ernst Tschan (to Durand & Huguenin A. G.).

Preparing a vattable composition capable of dyeing cellulosic fibers greenish-gray shades which comprises chlorinating benzanthrone in sulfuric acid, condensing the chlorinated benzanthrone mixture with approximately one molecular equivalent of alpha-amino anthraquinone in nitrobenzene in the presence of an acid-binder and a cupriferous catalyst to produce a mixture of secondary amines and recovering the mixture of secondary amines and subjecting said mixture of secondary amines to fusion with alcoholic caustic alkali and recovering the vat dyestuff so obtained. No. 2,456,589. Lawrence D. Lytle (to American Cyanamid Co.).

Preparing an improved pigment by mixing a pigment with a water-soluble omega-amino-alkyl-nitrile containing not to exceed 6 carbon atoms, and then polymerizing said nitrile on said pigment. No. 2,457,591. Maryalice Conley Moore (to E. I. du Pont de Nemours & Co.).

Canadian

Production of titanium dioxide in rutile crystalline modification by calcination in the presence of an antimony compound of hydrous titanium dioxide in the anatase form being effected in the presence also of at least one metallic compound selected from the group comprising compounds of zinc, magnesium, strontium, aluminum and zirconium. No. 453,081. Robert William Ancrum.

Water insoluble azo pigment. No. 453,117. Roy Herman Kienle (to Calco Chemical Co. to American Cyanamid Co.).

Modifying a pigment comprising calcium carbonate by subjecting a slurry comprising said pigment and water to blows from the teeth of a circular saw rotating at a peripheral velocity of not less than substantially 100 feet per second until a reduction is effected in at least one of the properties of adhesive requirement and oil absorption of said pigment. No. 453,320. Harold R. Rafton (to Raffold International Corp.).

Equipment

Rotary flexible vane pump. No. 2,455,194. Edward C. Rumsey, deceased (to Lillian Gray Rumsey).

Fractionation control apparatus. No. 2,456,398. Clarence G. Gerhold (to Universal Oil Products Co.).

Bubble cap. No. 2,457,398. David S. Roberts and Robert A. De Luca.

Packless globe valve. No. 2,457,472. George H. Hufferd and George O. R. Lindgren (to Weatherhead Co.).

Gas and liquid contact apparatus. No. 2,457,658. David P. Graham (to Peabody Engineering Corp.).

Gas scrubber. No. 2,457,667. Robert R. Harmon (to Peabody Engineering Corp.).

Gas and liquid contact apparatus. No. 2,457,686. Robert Kopita (to Peabody Engineering Corp.).

Canadian

Heat exchange apparatus. No. 453,282. Martin Frisch (to Foster Wheeler Corp.).

Heat exchanging apparatus. No. 453,328. Lauritz Benedictus Schibbye (to Svenska Cellulosa Aktiebolaget).

Spray crystallizing apparatus for nitroguanidine. No. 453,390. Charles P. Davis (to American Cyanamid Co.).

Food

Animal feed containing 4-methyl, 2-thiouracil. No. 2,456,515. Jonas Kamlet and Ralph P. Reece (to Thiokol Corp.).

Edible composition comprising an edible substance containing an antioxidant consisting of an organic sulfur compound selected from the group consisting of an organic sulfhydryl and a sulfur compound containing an unsubstituted amino group capable of enolizing to furnish a sulfhydryl group. No. 2,456,937. Paul Gyorgy, Martin B. Williamson and Eric T. Stiller (to Wyeth Inc.).

Inorganic

Producing an aluminum fluoride gel by digesting alumina with aqueous hydrofluoric acid. No. 2,454,921. Heinz Heinemann (to Porocel Corp.).

Extracting potash from Wyomingite comprising treating with sodium carbonate. No. 2,455,190. Robert D. Pike.

Gas and power producing composition comprising a blend of ammonium nitrate, urea, and ammonium nitrate; freezing point depressants selected from the group consisting of ammonium sulphamate, ammonium thiosulphate, ammonium formate, ammonium acetate, ammonium thiocyanate, ammonium hypophosphite, acetamide, propionamide, and methylamine nitrate. No. 2,455,205. John Whetstone and James Taylor (to Imperial Chemical Industries Ltd.).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

CIBANTINE. Coal tar colors. 443,582. Ciba Ltd.

Sandee. Synthetic plastic materials. 476,853. Sandee Mfg. Co.

PRIME SOHP. Water soluble detergent composition. 484,729. Beach Soap Co.

LOOSOL. Organic chemical preparation for use as an inhibitor to retard deterioration of organic material. 496,874. Tennessee Eastman Corp.

CYLATONE. Oil-like metal penetrant that contains chemical solvents for sludge removal. 499,859. Narf Co.

PERFECT CIRCLE CARTONIC. Additive having both chemical and lubricating properties for lubricating oils and liquid fuels. 501,-868. Perfect Circle Corp.

KAYKOTE. Ceramic coatings similar to baking enamel. 501,914. Kraus Research Laboratories.

Worthmore. Methyl alcohol anti-freeze, non-freeze liquid for tracto tire ballast. 501,921. Mutual Dealers Wholesale, Inc.

LO. All-purpose cleaner. 502,797. Brown Laboratories.

ONCE A PIONEER, ALWAYS A PIONEER. Printing lacquers for use on plastic sheetings. 504,490. Heribert, Inc.

TOXADUST. Insecticides. 504,879. Stauffer Chemical Co.

BLIGHTOX. Fungicides. 504,880. Stauffer Chemical Co.

(Symbol). Powdered cleanser. 504,881. Purex Corp., Ltd.

Sulf-A-Soap. Soap. 505,107. University Laboratories, Inc.

ClosMarKing. Textile ink. 505,119. John P. Nissen, Jr., Co.

SPRED-BRITE. Liquid wax for floors. 505,319. Seidlitz Paint & Varnish Co.

TERMITROL. Preparation used as a wood preservative and as a preventative against all forms of wood destroying organisms. 507,224. Artco Products Co.

S-50. Varnish or shellac. 507,697. Otto Eugen Schneibs Co.

D and D. Linseed oils, chemical paint and varnish removers, shellacs, turpentines, painters' naphthas, and thinners for paints. 509,-505. DeMert & Dougherty, Inc.

CENLAB. Embalming preparations. 511,-281. Marx Chemical Supply Co.

DeaDly To Pests. Insecticides and raticides. 512,195. National Chemical Exterminating Co.

PENTOSUL. Additive having an oil base suitable for incorporation in a small amount in a lubricating oil or grease. 512,539. Standard Oil Co.

KO-LUBE. Lubricating oil. 512,783. Ko-Lube Co.

(Symbol). Chemicals derived from corn—namely, whole protein derived from corn gluten, zein, calcium phytate, and inositol. 541,-937. Corn Products Refining Co.

CULLSORB. Manganese treated green sand for use as water treating material. 515,-084. Culligan Zeolite Co.

Quaker Girl. Self-polishing floor wax. 515,-534. C. M. Laboratory and Tool Co.

SESQUI-SEC. Modified soda. 515,647. Wyandotte Chemicals Corp.

n & f. Soap cleanser. 516,146. Nelson-French Co.

Wet Ege Spirits. Thinner for paint, varnish and enamel. 516,245. Anderson-Prichard Oil Corp.

RODANTU. Stomach and contact poison for the control or extermination of rats. 516,-636. Roberts Laboratories.

RBH. Pigment dispersions, pigments for the paint trade, flatting agents for the paint trade, lacquers, both finished and concentrates, ready-mixed and paste paints; oils, thinners, and resinous materials for general use in the paint trade. 516,897. Interchemical Corp.

POLLAX. Cellulose coating. 516,997. Henry Pollak, Inc.

excel. Hydraulic brake fluid. 519,812. Excel Chemical Co.

WARCO Grade A. Hydraulic brake fluid. 519,815. Warwick Laboratories Co.

FLAVAROMA. Chemical compositions for use in curing meats. 520,172. Meat Industry Suppliers, Inc.

10-9-0 Suds. Cleaning powders. 520,894. Pacific Powder Co.

PENNSALT ARRESTO-MOTH. Insecticides. 521,403. Pennsylvania Salt Mfg. Co.

RIG. Rust inhibiting grease. 521,163. Rig Products Co.

JETSPEED. General purpose cleanser for household and industrial use. 522,019. Package Products.

JETSPEED. General purpose cleaner for household and industrial use. 522,057. Package Products.

SILENTIZE WITH FENDIX. Car body undercoating and sound deadener in the nature of paint. 522,484. Davison Chemical Corp.

FLORNU. Liquid floor polish. 524,061. Fox Products Co.

COL-R-FAC. Lithographing inks. 525,306. O. B. Distributors.

SOVALAC. An oleoresinous varnish used in lieu of shellac, for wood, steel, or composition surfaces. 525,413. Socony-Vacuum Oil Co., Inc.

Burdsal's. Varnish, aluminum paint, automobile enamel, etc. 526,604. A. Burdsal Co.

SHURE KUTTER. Liquid paint and varnish remover. 526,707. National Chemical & Mfg. Co.

SAPOLIN. Paints. 527,041. Sapolin Paints, Inc.

NON-PAREIL. Sudsing cleaner, cleanser, and detergent. 527,680. Procter & Gamble Co.

LAUNETTE. Sudsing cleaner, cleanser, and detergent. 527,729. Procter & Gamble Co.

NO-EQUAL. Sudsing cleaner, cleanser, and detergent. 527,735. Procter & Gamble Co.

SARATOGA. Sudsing cleaner, cleanser, and detergent. 528,005. Procter & Gamble Co.

ORVUS. Sudsing cleaner, cleanser, and detergent. 528,029. Procter & Gamble Co.

GOLD BOND. Fertilizers. 528,420. Armour and Co.

RESOWELD. Thermoplastic resinous solutions. 528,453. Goodyear Tire & Rubber Co.

VICTAWET. Wetting agents. 528,544. Victor Chemical Works.

SUN-SECT. Insect repellants. 529,495. Kent Cosmetics.

Regal 4 SQUARE. Moth preventative and insecticide. 530,396. Galree Products Co., Inc.

MERKIN. Caulking compounds and plastic roofing coatings and water-resistant coatings. 530,416. M. J. Merkin Paint Co., Inc.

KALASEAL. Liquid water repellant material for application to brick, concrete, and other masonry materials and surfaces. 530,564. Protection Products Mfg. Co.

SOUTHERN OXYGEN. Oxygen, hydrogen, acetylene, nitrogen, carbon dioxide, propane, mixtures of carbon dioxide and oxygen, and mixtures of helium and oxygen. 531,734. Southern Oxygen Co.

BENLO. Industrial chemicals. 530,797. Benlo Chemicals.

SIMMONS. Paints. 531,048. Shapleigh Hardware Co.

SOKLEEN. Household bleach. 531,440. So Kleen Products.

(Symbol). Chemicals. 531,801. Griffin Chemical Co.

Scourite. Kitchen-utensil cleaners. 532,412. Springfield Wire & Tinsel Co.

D and D. Lubricating oils having anti-corrosive properties. 533,284. Demert & Dougherty, Inc.

Hampden. Waterproofing compounds for concrete, wood, plaster, stucco, and masonry. 533,562. Hampden Color & Chemical Co.

SOFTEX. Textile finishing agents. 533,577. E. F. Houghton & Co.

ARROW. Polishing powders. 533,970. Arrow Supply & Tool Co.

OPENING NIGHT. Soap. 534,155. Lucien Lelong, Inc.

XONOX. Detergent cleaning compound in liquid form. 534,398. Valley Chemicals Co.

GAYCO. House paint. 534,518. Dozier & Gay Paint Co.

HUBER. Fillers or pigments—namely, carbon blacks and clay, and for tackifiers made of pinetree gums and used in compounding rubber. 534,628. J. M. Huber Corp.

HUBER. Chemical compositions for use in compounding natural or synthetic rubber. 534,631. J. M. Huber Corp.

PETROFAC. Organic polar compound derived from petroleum used as an ingredient of cutting oil. 534,832. Sun Oil Co.

Florantrim. Varnishes. 534,944. True-Tagg Varnish Co.

Varnish Food. Liquid furniture polish. 535,059. McDougall-Butler Co.

T. Liquid and paste paints, liquid paint enamels, liquid undercoats, and liquid varnish. 535,901. Thresher Paint & Varnish Co.

T. Liquid and paste paints. 535,903. Thresher Paint & Varnish Co.

CONZOID. Chemical preparation used in treating water to eliminate oxygen and for the removal and prevention of scale, sludge and other harmful accumulations or growths in condensers, air-conditioning systems, and the like. 536,097. Klenzoid Corp.

Colloil. Lubricating oils. 536,496. Cardinal Chemical Corp.

NO-FLAME. Cotton which has been treated to render it fireproof. 536,540. Lockport Cotton Batting Co.

ESTERCIDE. Parasiticides. 536,582. California Spray-Chemical Corp.

INSECT-O-SOAP. Saponified liquid soap for use with insecticides as a carrier or spreader. 537,264. Andrew Wilson, Inc.

W.B. Insecticides, germicides, antiseptics, disinfectants, deodorants, and fungicides. 538,335. A. Reed Wilson Co.

DREADNOUGHT. Varnishes. 538,363. Chicago Paints, Inc.

UPON HONOR. Ready-mixed house, barn and floor paints. 538,722. Chicago Paints, Inc.

DULFECT. Varnishes. 538,775. W. W. Lawrence & Co.

HURRY-UP. Paint enamels, undercoaters and thinners. 538,788. W. W. Lawrence & Co.

ELROY. Turpentine. 539,402. El Roy Naval Stores Co., Inc.

"MITEY MITE". Chemical preparation for preventing sludge and gum formations, and to neutralize acids and prevent corrosion in internal combustion engines. 539,464. A & B Sales Corp.

GUM SOL. Paint in liquid and paste form. 539,715. Ling-Tite Paint Products Co.

Frigid. Embalming preparations. 539,949. Frigid Fluid Co.

DB. Paints sold in paste and liquid form. 540,046. De Boom Paint Co.

RUSTAREST. Chemical compounds in liquid form for use as a rust preventative and as a protective coating for metal. 540,075. International Rustproof Corp.

LAGOTEX. Ready-mixed paint. 540,676. International Paint Co., Inc.

INTERCLUB. Antifouling bottom paint. 540,677. International Paint Co., Inc.

ZORBALL. Liquid absorbent and floor sweeping compound. 540,953. Wyandotte Chemicals Corp.

PLASTIC WOOD. Plastic preparation composed chiefly of cellulose and sold as a substitute for wood. 541,256. Boyle-Midway, Inc.

POWERPHYL. Scrub soap. 541,928. Fuld Bros., Inc.

naturo. Embalming fluids. 542,048. Naturo Mfg. Co.

MARSH. Stencil marking inks. 542,221. Marsh Stencil Machine Co.

CLOROX. Bleaching, cleansing, antiseptic and germicidal compound. 542,284. Clorox Chemical Co.

Ultra-refined CHLOROX. Bleaching, cleansing, antiseptic, and germicidal compounds. 542,286. Chlorox Chemical Co.

Stalfort's '68. Shoe paste and shoe cleaner. 542,364. John C. Stalfort & Sons, Inc.

aerfloted. Carbon black and for clay fillers. 542,409. J. M. Huber Co.

SUPREX. Clay. 542,410. J. M. Huber Co.

"GY-BEN". Insecticides. 543,175. Geigy Co., Inc.

DURAKRAFT. Wood pulp. 543,563. Brown Co.

SLO-SURFACE. Wax for floors. 543,806. Franklin Research Co.

Pliogrip. Adhesive cement comprising a blend of rubber and a resin. 543,807. Goodyear Tire & Rubber Co.

BRIJ. Emulsifying, dispersing, solubilizing and wetting agents. 543,871. Atlas Powder Co.

SILVER PUFF. Silver polish. 544,348. Hill Mfg. Co.

MIRAMIDE. All-purpose cleaner. 544,456. John J. O'Connor, Inc.

Glid-N. Herbicides and insecticides. 545,364. Glidden Co.

VELCHRUM. Paint product pigmented with aluminum. 545,775. Rinshed-Mason Company.

CIPCO. Moth sprays, disinfectants, and insect killers. 546,189. Commercial and Industrial Products Co.

Seal Brand. Silicate of soda. 547,398. Philadelphia Quartz Co.

ELECTRIC. Sulfur. 547,787. Stauffer Chemical Co.

JAN-O. Scouring powder, soap powder, liquid soap, and sweeping compound. 547,996. Janitors Supply House, Inc.

VICAR STAR. Cleanser in powder form for use in electric dishwashing machines. 548,620. Virginia-Carolina Chemical Corp.

DYCLENE. Chemical preparation for cleaning metals prior to electroplating. 548,973. MacDermid, Inc.

METALEX. Dry alkaline cleansing preparations in the nature of soluble salts for cleaning metals preparatory to plating, buffing, etc. 548,975. MacDermid, Inc.

SOUTHERN. Adhesives for fastening brake linings and clutch facings to brake bands, brake shoes, and brake or clutch discs. 549,025. Southern Friction Materials Co.

Edmur. Silver polish. 549,240. Edmur Laboratories.

RIVICOL. Insecticide. 549,277. Riverdale Chemical Co.

STERNO. Metal polish. 550,270. Sterno, Inc.

CALIBEX. Calcined diaspore, which is a high temperature or refractory aggregate. 550,394. Denver Fire Clay Co.

Bathasweet. Soap. 550,777. Bathasweet Corp.

Buffalo. Chemical kits for recharging antifreeze fire extinguishers. 550,990. Buffalo Fire Appliance Corp.

BUFFALO better-built. Chemical kits for recharging fire extinguishers. 550,991. Buffalo Fire Appliance Corp.

DU PONT. Plastic-coated fabrics. 551,172. E. I. Du Pont de Nemours & Co.

Evangeline. Shoe dye. 551,174. Evangeline Products, Inc.

Faymus. Indelible and opaque inks. 551,432. Bankers & Merchants Stamp Works.

CARTER'S. Indelible and marking inks. 551,523. Carter's Ink Co.

Vitagreen. Fertilizers and plant food. 551,981. Kaw River Valley Fertilizer Co.

CHEM-TUNE. Chemical composition for use in removing carbon deposits, dirt and sludge from and to otherwise clean internal combustion engines. 552,273. V-O Mfg. Co.

Old Walnut. Hydraulic brake fluid. 552,680. McLeod Rubber Co.

SCAT. Atmospheric deodorants. 552,897. Synco Products.

ARDOL. Photographic chemicals. 552,969. General Aniline & Film Corp.

G A & F. Carbonyl iron powder. 553,098. General Aniline & Film Corp.

GAYLO. Library adhesive. 553,357. Gaylord Bros., Inc.

Coragum. Combination of dry starches, used as an adhesive in paste form. 553,467. Corn Products Refining Co.

Hawkeye. Starch for laundry and manufacturing purposes. 553,468. Corn Products Refining Co.

Lam-o-dex. Combination of dry starches, dextrines, or gums, for pasting purposes. 553,469. Corn Products Refining Co.

Mogul. Core binder made of starch. 553,470. Corn Products Refining Co.

PROTOX. Zinc oxide used for industrial purposes. 553,505. New Jersey Zinc Co.

SANTOCURE. Compound used as a vulcanizing accelerator. 553,889. Monsanto Chemical Co.

SANTALOOM. Surface active compounds for general use in the industrial arts. 553,890. Monsanto Chemical Co.

SANTOMON. Surface active compounds for general use in the industrial arts. 553,891. Monsanto Chemical Co.

TUSSY. Soap and washing and spotting compound. 554,314. Lehn & Fink Products Corp.

GLUAID. Converted starch product suitable for uses similar to glue and used alone or with glue for adhesive purposes. 555,459. Stein, Hall & Co., Inc.

WNU. Printing inks. 555,715. Western Newspaper Union.

METSO 99. Silicate of soda. 556,217. Philadelphia Quartz Co.

METAPHEN. Chemical compound for use as an antiseptic, as a germicide, and/or as a disinfectant. 556,723. Abbott Laboratories.

Swifty FLOOR SHAMPOO. Cleaning preparations for removing wax from floors and for washing floors. 558,003. Boston Chemical Industries, Inc.

PX. Plastic impregnated fabrics. 558,287. E. I. Du Pont de Nemours & Co.

SWANOTRET. Composition consisting of a mixture of a mononuclear or monocyclic aromatic liquid hydrocarbon compound and a polynuclear or polycyclic condensed ring aromatic hydrocarbon compound for introduction in oil wells, casings, pipes and lines for preventing and removing paraffin deposits. 558,325. Swan Chemical Co.

POLESTAR. Cleaning compound containing caustic soda for heavy degreasing and bottle washing. 558,365. Cudahy Packing Co.

GOULAC. Chemical compound useful as an emulsifying and dispersing agent in the manufacture of road oils, portland cement, and ore flotation. 558,984. American Gum Products Co.

HAMILUBRIC. Self-emulsifiable oil used in water dilution as a hydraulic lubricant and rust preventative. 560,106. Haas-Miller Corp.

CONTI VERE. Soap. 560,548. Conti Products Corp.

ULTROSOL. Synthetic resins. 568,090. Monsanto Chemical Co.

PANEX. Cleaner for metal surfaces. 558,363. Cudahy Packing Co.

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